

IONOSPHERIC DATA IN JAPAN

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« Real Time Ionograms on the Webhttp://wdc.nict.go.jp/index_eng.html »



NATIONAL INSTITUTE OF INFORMATION
AND COMMUNICATIONS TECHNOLOGY
TOKYO, JAPAN

INTRODUCTION

This Series contains data on ionosphere (I) and solar radio emission (S) obtained at the following stations under the

National Institute of Information and Communications Technology, Japan.

Stations	Geographic(WGS84)		Geomagnetic (IGRF-10(2005))		Technical Method
	Latitude	Longitude	Latitude	Longitude	
*Wakkanai/Sarobetsu	45°10'N	141°45'E	36.4°N	208.9°	Vertical Sounding (I)
Kokubunji	35°43'N	139°29'E	26.8°N	208.2°	Vertical Sounding (I)
Yamagawa	31°12'N	130°37'E	21.7°N	200.5°	Vertical Sounding (I)
Okinawa	26°41'N	128°09'E	17.0°N	198.6°	Vertical Sounding (I)
Hiraiso	36°22'N	140°37'E	27.6°N	209.1°	Solar Radio Emission (S)

*We moved the observation facilities at Wakkanai to Sarobetsu on February 2009. The new observatory is located at approximately 26km south from the old observatory. The observation at Sarobetsu commenced on March 6, 2009.

IONOSPHERE

Ionospheric observations are carried out at the above four stations in Japan by means of vertical sounding using ionosondes. The ionosonde produces ionograms, which are recorded digitally on a computer storage medium. The digitally-recorded ionograms are collected from each station by the central computer and reduced to numerical values and Summary Plots by the automatic processing system. The ionograms obtained at Kokubunji are manually scaled by experienced specialists to supplement automatically-scaled parameters.

A1. Automatic Scaling

Digital ionograms are automatically scaled by the pattern recognition method. The following five characteristics of the ionospheric are listed below. The reliability of these factors has been ascertained by comparison of the automatically-scaled parameters with the manually-scaled values of large amounts of test ionograms.

The published data consist of tabulations of hourly values of three factors ($foF2$, fEs , $fmin$) and monthly medians of two factors ($h'Es$, $h'F$), daily Summary Plots and monthly medians plot of $foF2$.

a. Characteristics of Ionosphere

$foF2$	Ordinary wave critical frequency for the $F2$ layer
fEs	Highest frequency of the Es layer whether it may be ordinary or extraordinary
$fmin$	Lowest frequency which shows vertical iono-spheric reflections
$h'Es$ $h'F$	Minimum virtual height on the ordinary wave for the Es and F layers, respectively

b. Descriptive Letters

The following descriptive letters are used in the tables.

- A Impossible measurement because of the presence of a lower thin layer, for example Es (for $foF2$).
- C Impossible measurement because of any failure in observation.
- G Impossible automatic scaling because of very small ionization density of the layer (for fEs).
- N Impossible automatic scaling because of complex echoes.
- Blank No digital record because of problems occurring in the auto matic data processing system, but existence of film record.

c. Definitions of CNT, MED, UQ ,and LQ

Median count (CNT) is the number of numerical values from which the median has been computed. In addition to numerical values, the count may include a descriptive letter G.

Median (MED) is defined as the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the **lower quartile (LQ)** is the median value of the lower half.

If CNT is less than 10, there are blank spaces left.

d. Reliability of Automatic Scaling

The results of the comparison between automatically-scaled values and manually-scaled ones showed that hourly values of $foF2$, fEs and $fmin$ were scaled within a difference of 1 MHz from about 90, 90 and 99%, respectively of the test ionograms.

e. Summary Plot

Daily Summary Plots which are made from quarter-hourly digital ionograms are published to present general ionosphere conditions. The upper and middle parts of a Summary Plot show the diurnal variation of the frequency range of the echoes reflected from the F and E regions, respectively. The two solid arcing lines indicate the predicted values of fxE and foE calculated by the method described in the CCIR report 340. The lower part shows the diurnal variation of the virtual height where the echo traces become horizontal.

A2. Manual Scaling

The published data consist of tabulations of hourly values of the ionospheric characteristics and figures of daily f -plot.

All symbols and terminology in the tables or figures of ionospheric data are used in accordance with the "URSI Hand-book of Ionogram Interpretation and Reduction (Second Edition) 1972 " and its revision of chapters I-4, published in July 1978.

a. Characteristics of Ionosphere

fxl	Top frequency of spread F trace
$foF2$ $foF1$ foE $foEs$	Ordinary wave critical frequency for the $F2$, $F1$, E , and Es (including particle type E) layers, respectively
$fbEs$	Blanketing frequency of the Es layer, e.g. the lowest ordinary wave frequency visible through Es
$fmin$	Lowest frequency that shows vertical ionospheric reflections
$M(3000)F2$ $M(3000)F1$	Maximum usable frequency factor for a path of 3000 km for transmission by the $F2$ and $F1$ layers, respectively
$h'F2$ $h'F$ $h'E$ $h'Es$	Minimum virtual height on the ordinary wave for the $F2$, whole F , E and Es layers, respectively
Types of Es	See below b. (iii)

b. Symbols

(i) Descriptive Letters

The following letters are entered after, or used to replace a numerical value on the monthly tabulation sheets, if necessary.

- A** Measurement influenced by, or impossible because of, the presence of a lower thin layer, for example *Es*.
- B** Measurement influenced by, or impossible because of, absorption in the vicinity of *fmin*.
- C** Measurement influenced by, or impossible because of, any non-ionospheric reason.
- D** Measurement influenced by, or impossible because of, the upper limit of the normal frequency range in use.
- E** Measurement influenced by, or impossible because of, the lower limit of the normal frequency range in use.
- F** Measurement influenced by, or impossible because of, the presence of spread echoes.
- G** Measurement influenced by, or impossible because the ionization density of the layer is too small to enable it to be made accurately.
- H** Measurement influenced by, or impossible because of, the presence of a stratification.
- K** Presence of particle *E* layer.
- L** Measurement influenced or impossible because the trace has no sufficiently definite cusp between layers.
- M** Interpretation of measurement questionable because the ordinary and extraordinary components are not distinguishable.
- N** Conditions are such that the measurement cannot be interpreted.
- O** Measurement refers to the ordinary component.
- P** Man-made perturbations of the observed parameter; or spur type spread *F* present.
- Q** Range spread present.
- R** Measurement influenced by, or impossible because of, attenuation in the vicinity of a critical frequency.
- S** Measurement influenced by, or impossible because of, interference or atmospheric.
- T** Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.
- V** Forked trace which may influence the measurement.
- W** Measurement influenced or impossible because the echo lies outside the height range recorded.
- X** Measurement refers to the extraordinary component.
- Y** Lacuna phenomena, severe layer tilt.
- Z** Third magneto-electronic component present.

(ii) Qualifying Letters

The following letters are entered in the first column before a numerical value on the monthly tabulation sheets, if necessary.

- A** Less than. Used only when *fbEs* is deduced from *foEs* because total blanketing of higher layer is present.
- D** Greater than.
- E** Less than.
- I** Missing value has been replaced by an interpolated value.
- J** Ordinary component characteristic deduced from the extraordinary component.

M Mode interpretation uncertain.

O Extraordinary component characteristic deduced from the ordinary component. (Used for x-characteristics only.)

T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful.

U Uncertain or doubtful numerical value.

Z Measurement deduced from the third magneto-electronic component.

(iii) Description of Types of *Es*

When more than one type of *Es* trace are present on the ionogram, the type for the trace used to determine *foEs* must be written first. The number of multiple trace is indicated after the type letter.

The types are:

- f** An *Es* trace which shows no appreciable increase of height with frequency.
- l** A flat *Es* trace at or below the normal *E* layer minimum virtual height or below the part *E* layer minimum virtual height.
- c** An *Es* trace showing a relatively symmetrical cusp at or below *foE*. (Usually a daytime type.)
- h** An *Es* trace showing a discontinuity in height with the normal *E* layer trace at or above *foE*. The cusp is not symmetrical, the low frequency end of the *Es* trace lying clearly above the high frequency end of the normal *E* trace. (Usually a daytime type.)
- q** An *Es* trace which is diffuse and non-blanketing over a wide frequency range.
- r** An *Es* trace showing an increase in virtual height at the high frequency end similar to group retardation.
- a** An *Es* trace having a well-defined flat or gradually rising lower edge with stratified and diffuse traces present above it.
- s** A diffuse *Es* trace which rises steadily with frequency and usually emerges from another type *Es* trace.
- d** A weak diffuse trace at heights below 95 km as-associated with high absorption and large *fmin*.
- n** The designation 'n' is used to denote an *Es* trace which cannot be classified into one of the standard types.
- k** The designation 'k' is used to show the presence of particle *E*. When *foEs* > *foE* (particle *E*) the *Es* type precedes k.

c. Definitions of the CNT, MED, UQ and LQ

Median count (CNT) is the number of values from which the median has been computed. In addition to numerical values, the count may include certain descriptive letters.

Median (MED) is the middle value when the numerical values are arranged in order of magnitude, or the average of the two middle values if there is an even number of values.

Upper quartile (UQ) is the median value of the upper half of the values when they are ranked according to magnitude; the **lower quartile (LQ)** is the median value of the lower half.

HOURLY VALUES OF fof2 AT Wakkanai

DEC. 2017

LAT. 45°10.0' N LON. 141°45.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	52	54	52	50	48	40	25	42	54	54	67	70	68	58	62	53	A	42	A	37	A	36	34	50
2	52	34	34	34	34	34	48	54	58	62	67	68	61	61	60	49	38	31	30	36	38	34	36	37
3	42	41	36	42	32	31	25	42	46	50	57	60	61	53	55	48	37		30	25	34	40	42	42
4	50	42	51	50	37	38	36	42	54	53	49	58	55	54	48	55	41	28	30	35	32	36	36	38
5		38	38	37		26	28	41	66	57	78	68	71	60	64	63	54	38	54	51	52	54	58	54
6	52	54		54	54		50	54	58	65	65	81	89	63	64	55	45	38	29	32	A	34	37	34
7	37	34	34	34	34	32	28	41	51	54	66	69	62	55	58	55	40	42	A	46	53	32	A	50
8	50	42	48	32	34	28	N	41	54	61	65	64	56	55	60	54	41	A	A	40	50	41	A	48
9	41	42	41	42	32	32	A	A	48	A	58	64	61	46	45	50	35		A	25	A	28	34	39
10	42	42	37	36	32	29	28	42	54	49	51	60	59	54	51	52	40	24	A	A	31	30	31	34
11	A	34	34	37	36	29	28	40	49	54	56	51	64	61	47	50	42	34	A	36	40	41	38	41
12	40	40	40	37	36	32	49		52	51	57	67	89	53	54	63	44	30	30		34	59	28	34
13	26	32	34	35	32	34	31	40	66	64	57	61	64	72	55	54	42	34	34	48	50	50	50	51
14	42	44	50	51	34	28	28	42	54	54	59	70	62	58	55	48	42	29	34	34	43	42	47	50
15	51	52	50	52	52	44	36	50	55	54	58	56	58	52	53	58	35	29	29	36	42	36	37	50
16	41	52	48	50	48		29	40	53	34	59	58	N	54	50	54	79	34	35	36	34	38	A	42
17	43	42	42	46	34	34	23	38	48	50		38	48	55	54	54	42	31	24	30	34	32	32	34
18	34	34	36	32	32	189		40	55	61	64	62	67	79	51	57	45	30	A	A	39	34	35	A
19	A	34	34	35	32	31	32	A	A	54	55	61	55	55	60	47	34	23	28		26	32		
20	42	41	39	41	42	36	26	42	54	60	66	52	59	70	69	49	37	30	29	35	34	47	52	52
21	41	42	34	31	29	N	N	34	44	51	55	56	57	53	55	54	36	A	A	30	A	A	26	30
22	30	31	32	31	A	N	A	35	47	54	56	54	54	59	79	49	A	A	A	A	A	28	A	30
23	A	31	32	25	28	25	A	34	49	54	50	54	53	52	56	47	42	A	A	A	A	A	30	34
24	32	34	34	32	29	28	28	34	51	53	54	58	58	54	60	76	41	34	26	32	34	34	34	34
25	34	34	34	34	30	30	26	34	N	62	58	67	59	58	56	52	42	34	A	A		28	32	42
26	42	40	36	34	36	35	A	37	46	54	65	65	65	55	62	A		A	A	A	32	A	A	34
27	32	32	38	34	37	37	29	42	48	58	65	54	58	64	60	46	48	35	31	A	A	48	52	
28	49	50	52	31	44	40	A	32	47	61	62	58	89	59	52	55	49	A	34	42	54	42	49	50
29	52	50	49	29	28	34	34	37	49	50	50	59	57	99	109	A	85	A	A	34	A	31	34	36
30	38	47	42	40	36	34	28	32	N	51	61	72	59	59	57	48	41	34	A	A	29	36	42	
31	48	50		47	32	51	41	42	51	54	65	64	56	55	55	51	A	A	A	A	A	28	34	39
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	27	31	29	31	29	27	23	28	28	30	30	31	30	31	31	29	27	21	16	21	21	27	25	29
MED	42	41	38	36	34	34	28	40	52	54	58	61	59	55	56	53	42	34	30	35	34	36	35	41
U Q	50	47	48	46	37	37	36	42	54	60	65	67	64	61	60	55	45	34	34	38	46	41	44	50
L Q	37	34	34	32	32	29	28	36	48	51	56	56	57	54	53	49	38	29	29	31	33	32	33	34

HOURLY VALUES OF fEs AT Wakkanai

DEC. 2017

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	G	G	G	G	G	G	144	69	32	49	G	40	46	40	109	32	60	25	56	G	G	G
2	G	31	27	26	G	G	G	120	G	31	30	31	49	214	G	G	28	G	G	G	29	G	G	G
3	G	G	G	G	34	G	G	11	47	26	G	90	52	37	39	149	11	G	G	G	G	G	G	G
4	G	24	G	G	G	G	G	11	48	146	39	34	41	34	31	34	40	G	G	G	G	G	G	G
5	G	G	G	G	G	G	G	31	157	50	46	37	38	32	26	34	32	40	43	41	29	28	32	G
6	G	G	G	G	G	G	G	28	23	30	G	33	44	30	G	G	19	32	35	32	88	26	G	24
7	G	G	G	G	G	G	G	39	72	111	58	41	29	89	53	48	27	38	58	32	71	58	72	54
8	60	26	G	G	G	G	G	29	G	48	48	49	50	115	53	48	47	52	29	27	56	31	46	33
9	32	30	28	28	30	31	121	70	59	83	34	38	39	39	108	40	35	G	71	32	59	60	34	28
10	G	G	G	G	G	59	G	25	32	117	49	48	48	G	28	45	32	28	60	56	39	35	32	G
11	40	G	G	G	G	G	G	G	124	34	48	53	34	38	33	41	31	34	34	34	56	26	G	33
12	32	24	G	G	G	G	G	G	24	36	50	36	110	58	30	G	41	23	G	G	G	G	G	G
13	29	G	26	G	G	G	G	26	G	32	34	36	37	32	32	48	43	160	G	G	G	G	G	G
14	G	G	G	G	G	G	G	178	49	52	41	40	50	40	27	23	35	G	26	G	23	160	G	G
15	130	G	G	27	G	G	G	44	54	44	31	54	48	33	39	108	35	G	G	27	38	107	26	G
16	40	G	G	G	G	G	G	G	G	40	135	60	108	34	91	92	107	56	G	31	40	106	131	56
17	G	G	G	G	26	G	G	33	49	35	G	41	38	39	43	32	33	27	28	G	G	G	25	23
18	G	G	G	G	112	225	G	G	32	40	57	88	57	35	33	48	G	32	31	49	G	G	G	38
19	36	G	24	27	G	G	G	57	59	34	32	33	44	48	35	31	G	G	G	G	G	26	G	G
20	27	48	34	33	26	G	G	21	31	37	40	141	40	41	32	G	38	G	G	G	G	G	G	G
21	G	G	G	G	G	G	G	29	G	27	27	G	34	31	28	44	34	113	58	G	34	28	25	G
22	G	29	G	G	30	27	34	G	44	25	29	31	32	34	91	64	87	78	59	39	43	29	29	G
23	32	29	32	23	G	108	33	G	G	G	G	86	G	34	28	G	40	59	32	33	45	33	G	G
24	G	G	G	G	G	G	G	G	41	44	33	31	68	G	48	79	11	G	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	48	29	48	33	40	38	39	44	33	30	39	31	G	G	G	G
26	G	G	G	G	G	G	32	32	48	34	38	38	82	38	36	91	G	126	60	38	55	58	45	27
27	G	G	G	G	G	G	G	11	91	37	38	40	40	51	38	41	46	G	33	40	48	40	32	G
28	G	G	G	30	30	29	25	26	G	35	32	50	53	51	35	30	28	60	34	G	29	30	G	G
29	G	G	G	G	G	G	G	G	G	49	53	70	68	43	47	107	93	153	92	27	33	G	28	106
30	G	G	G	106	26	26	G	G	45	29	42	91	163	35	31	28	11	86	93	52	35	28	41	30
31	26	G	G	27	26	G	G	40	46	87	31	48	28	G	59	26	58	85	110	90	60	33	G	G
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	29	31	30	29	30	30	31	31	30	31	31	31	31	31	30	29	31	29	30	31	30	30
MED	G	G	G	G	G	G	G	26	45	37	38	41	44	38	35	41	34	32	33	31	34	28	G	G
U Q	32	24	G	26	26	13	G	33	54	50	48	54	53	43	47	48	43	69	59	38	55	35	32	28
L Q	G	G	G	G	G	G	G	G	G	31	31	34	37	33	30	28	28	G	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Wakkanai

DEC. 2017

LAT. 45°10.0' N LON. 141°45.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	14	14	15	15	22	22	17	16	29	24	21	15	14	14	14	14	15	15	14	14
2	14	14	14	15	14	15	14	15	23	16	17	18	27	27	23	14	15	18	14	15	14	14	14	14
3	14	14	14	14	14	14	15	14	18	14	15	14	15	15	15	18	14		14	15	14	14	14	14
4	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	16	14	14	14
5		14	14	14		14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	15
6	14	15		14	14		14	14	14	14	14	14	14	15	15	14	14	14	14	14	14	15	14	14
7	14	14	15	14	14	15	14	15	14	14	14	14	14	15	14	18	15	14	14	14	14	14	14	14
8	15	14	14	14	15	14	14	14	14	14	15	15	14	15	15	15	14	14	14	14	14	14	14	14
9	15	14	14	14	14	14	15	14	14	14	14	15	15	14	14	15	15		14	15	14	15	14	15
10	14	14	14	14	14	15	14	15	14	14	14	14	15	15	14	14	15	14	14	14	15	14	14	14
11	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
12	14	15	14	15	14	15	15		15	14	14	14	14	14	14	18	14	15	14		14	18	18	14
13	14	14	14	14	14	14	15	15	14	14	14	14	14	14	14	20	14	16	15	14	14	14	14	15
14	14	14	14	14	14	14	14	14	14	14	15	14	14	15	14	15	14	20	14	14	14	14	14	14
15	14	14	15	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	20	14	14	14	14	14
16	15	14	14	14	14		14	14	14	14	14	14	14	15	14	14	14	14	22	14	14	14	14	14
17	14	14	14	14	14	14	14	15	15	14		14	14	14	14	14	14	14	14	15	14	15	15	14
18	14	14	14	14	14	14		14	14	14	14	15	14	14	14	21	14	14	15	14	14	15	14	14
19	14	15	14	14	14	15	14	14	14	14	14	14	14	14	14	14	17	15	14		17	14		
20	14	14	14	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	15	14	14	14	14	14
21	14	14	14	14	14	14	14	14	15	15	15	29	18	23	15	16	14	14	17	14	14	14	14	14
22	14	14	15	14	14	15	14	14	15	14	15	18	22	17	16	14	14	14	14	14	14	14	14	14
23	14	15	14	14	14	14	16	14	20	14	27	28	27	16	15	14	14	14	14	14	14	14	14	14
24	14	14	14	15	14	14	15	14	21	23	27	28	32	16	17	20	14	14	16	14	14	15	14	15
25	14	15	14	14	14	14	14	14	20	14	15	15	15	14	14	14	14	14	14		14	14	14	14
26	14	14	14	14	14	15	15	14	15	14	14	14	14	14	14	14		14	14	14	14	14	14	14
27	14	14	14	14	14	14	15	14	14	15	14	15	15	14	15	15	15	15	14	14	14	14	14	14
28	14	14	14	14	15	14	18	15	14	15	14	14	14	14	14	15	14	14	14	14	14	14	14	14
29	14	14	14	14	14	14	14	15	16	14	14	14	15	14	14	14	14	14	14	14	14	14	15	14
30	14	15	14	17	14	14	14	14	17	14	15	15	15	15	14	14	15	14	14	14	14	14	14	14
31	14	14		14	14	14	14	14	15	15	23	15	17	15	14	15	14	14	14	14	14	14	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	31	29	31	30	29	30	30	31	31	30	31	31	31	31	31	30	29	31	29	30	31	30	30
MED	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
U Q	14	14	14	14	14	14	15	15	16	15	15	15	15	15	15	15	14	14	14	14	14	14	14	14
L Q	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

HOURLY VALUES OF foF2 AT Kokubunji

DEC. 2017

LAT. 35°43.0' N LON. 139°29.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	31	42	42	37	34	27		50	55	55	68	72	64	71	54	54	50	36	A	58	30	25	A	A	
2	31	28	31	30	28	26	N	50	55	65	56	65	65	61	58	55	41		27	26	38	24			
3	26	27		26	30	N	N	41	51	55	52	59	59	64	54	52	44	23		27	27	N	26		
4	30	30	31	31	30	N	N	47	50	51	52	51	54	56	56	48	53	A	N		30	31	30	23	27
5	27	26	26	30		N	N	38	51	80	80	100	85	76	69	59	63	37	30	37	38	37	30	28	
6	30	A	25	31	30	30	28	42	54	59	65	65	68	78	62	58	48	36	34	30		30	28	28	
7	26	28	25	26	58	N	28	47	49	52	59	65	62	65	53	50	47	32	32	35	A	A	A	N	
8	26	26	30	28	A	48	N	39	54	68	68	71	109	A	57	54	23	25	36	36	A	A	A	A	
9	A	A	A	A	A	A	A	50	55	50	54	55	A	58	A	49	44	31	27	30	A	A	27	30	
10	36	31	27	27	27		30	51	51	54	53	55	62	61	60	49	47	A	32	28	30	A	A	A	
11	31	31	30	30	58		30	50	50	55	62	62	54	55	63	52	48	27	26	27		34	31	28	
12	34	32	32	31	30	30	N	44	58	56	58	56	A	70	62	56	48	35	A	A	A	34	26	30	
13	32	32	28	30	27	28	33	39	54	65	61	56	62	65	67	55	51	35	A	30	39	30	34	36	
14	37	38	36	36	32	30	28	46	54	51	55	70	69	57	61	50	41	32	27	36	32	58	28	32	
15	34	32	31	31	31	27	28	N	49	49	38	65	66	72	58	45	49	30	A	N	27	25	26	30	
16	31	31	32	32	30	30		51	54	55	58	67	54	64	57	52	44		A	39	25	28	30	31	
17	32	30	31	30	30	N		39	37	49	51	61	A	55	55	56	48	A	A	27	36	32	N	26	
18	31	32	25	31	31	31	N	42	55	54	64	67	75	70	60	54	N	38	34	27	31	A	A	26	
19	26	27	28	26	N	28	31	47	44	48	51	65	64	58	55	55	48	27	30	A	N	N	26	31	
20	32	30	58	30	31	30		42	51	51	57	65	58	64	A	64	47	30	28	A		36	34	25	31
21	30	30	28	28	28	A	A	47	47	50	57	68	56	51	58	54	47	30		30	36	58	58	27	
22		30	30	29	A	A	A	42	54	46	49	70	57	65	N	54	51	30		30	31	N	N		
23		27	28	27	27	N	N	43	51	46	52	57		54	54	52	47	36	28	28	26	27	N	27	
24	A	30	30	31	27	N	27	N	53	47	52	67	71	70	64	55	48	37	31	34	30	26	27	30	
25	31		30	30	27	28	31	44	55	54	68	63	66	59	55	49	51	41	36	25			28	27	
26	27	27	27	28	A	A	24	36	51	49	61	78	62	62	50	63	51	34	32	32	28	A	30	31	
27	31	30	28	30	23	26	28	49	48	57	57	A	A	72	79	55	51	A	27	31	30	28	31	31	
28	32	30	27	N	A	A	A	N	48	55	72	70	53	57	59	60	43	26	31	A	21	25	27	27	
29	26	26	26	26	25	26	A	42	50	51	55	62	A	53	68	108	A	A	A	26	A	25	27	30	
30	32	30	30	36	39	A	A		64	49	52	58	68	62	54	49	49	A	30	37	A	A	26	21	
31	30	34	35	32	30	27	31	54	51	55	50	75	55	48	56	55	N	34	30	31	30	31	27	A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	27	28	29	29	24	16	13	27	31	31	31	30	25	30	28	31	28	23	20	26	21	20	22	23	
MED	31	30	30	30	30	28	28	44	51	54	57	65	62	62	58	54	48	32	30	30	30	30	27	30	
U Q	32	31	31	31	31	30	31	50	54	55	62	70	68	70	62	56	50	36	32	35	36	34	30	31	
L Q	27	27	27	28	27	27	28	42	50	49	52	59	56	57	55	50	45	30	27	27	27	25	26	27	

HOURLY VALUES OF fEs AT Kokubunji

DEC. 2017

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	G	G	G	G	G	29		G	46	33	53	65	G	G	31	34	G	31	30	G	25	25	58	32	
2	G	G	G	G	G	24	G	29	30	29	34	39	31	33	G	27	G		G	G	G	G			
3	G	G		G	G	G	G	42	29	32	34	42	36	42	41	34	32	G		G	G	G	G		
4	G	G	G	G	G	26	G	47	29	29	31	34	33	39	33	60	47	49	G	G	G	G	G	G	
5	G	G	G	G		G	G	28	35	35	45	45	56	50		31	G	35	G	G	G	G	G	G	
6	G	34	G	G	G	G	G	29	40	39	31	40	38	39	68	36	28	G	G			G		G	
7	G	G	G	G	26	G	G	G	28	37	32	34	55	56	40	46	43	31	27	G		41	32	29	33
8	27	G	24	29	29	G	G	G	53	35	36	42	62	109	49	31	47	G	26	49	34	104	55	70	
9	45	34	38	36	56	57	53	43	34	41	42	55	82	128	109	53	54	35	G	G	71	57	G	G	
10	G	G	G	G	26		G	47	48	34	50	45	40	36	36	31	G	33		G	G		44	59	35
11	G	G		G	G		24	24	32	37	38	53	34	35	36	29	38	35	26	G		G	G	G	
12	G	G	G	G	G	G	G	28	35	39	53	131	67	72	64	50	31	G	31	42	33	26	G	G	
13	G	G	G	G	G	G	G	42	45	36	42	67	48	36	43	51	32	G	34	26	G	11	G	G	
14	G	G	G	G	G	G	G	21	29	32	37	35	41	36	29	31	27	26	G	G	G	G	G	G	
15	G	G	G	G	G	G	G	24	31	35	47	45	32	47	42	G	29	33	26	G	G	G	G	G	
16	G	G	G	G	G	G		29	29	50	33	113	32	29	33	35	45		27	G		G	G	G	
17	G	G	G	G	G	G		40	52	51	72	42	57	50	36	43	27	29	65	32	29	27	G	G	
18	G	G	G	G	G	G	G	26	28	32	35	48	43	42	34	31	28	G	G	G	26	29	26	26	
19	G	G	G	G	26	G	G	G	28	31	42	37	39	35	40	52	27	G	G	31	G	G	G	G	
20	G	G	G	G	26	G		G	G	28	42	42	52	57	72	63	39	G	G		27	G	G	G	G
21	G	G	G	G	G	33	36	G	G	G	G	G	33	G	42	G	G	31		G	G	G	G	G	
22		G	G	G	29	31	31	G	G	G	31	35	43	76	68	34	G	29		G	G	G	G		
23		G	G	G	G	G	G	G	157	43	33	29		G	28	44	G	36	G	G	G	G	G	G	
24	29	G	G	G	G	G	G	G	49	G	43	34	42	33	30	47	G	26	G	G	G	G	G	G	
25	G		G	G	G	G	G	G	28	31	36	33	31	36	42	29	50	55	25	G			G	G	
26	G	G	G	G	46	40	38	G	33	32	39	42	44	45	51	39	40	24	G	G	26	30	G	G	
27	G	G	G	G	G	G	G	G	31	32	61	127	102	37	54	35	G	38	31	G	G	G	G	G	
28	G	G	G	G	54	45	24	G	35	39	32	31	42	45	45	40	45	G	G	65	30	25	28	27	
29	G	25	24	G	G	G	24	G	33	36	42	42	70	55	52	42	107	136	72	54	39	25	G	G	
30	G	G	G	G	41	42	37		29	32	40	51	47	49	79	53	34	83	G	32	37	34	G	G	
31	26	27	G	G	G	G	G	31	32	35	34	34	45	42	34	36	45	29	G	25	29	25	G	153	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	29	30	30	31	30	29	27	30	31	31	31	31	30	31	31	31	31	29	28	31	28	30	30	28	
MED	G	G	G	G	G	G	G	22	32	35	38	42	42	42	41	36	31	29	G	G	G	G	G	G	
U Q	G	G	G	G	26	27	24	29	40	39	43	51	55	50	52	47	45	35	27	31	29	27	G	13	
L Q	G	G	G	G	G	G	G	G	29	32	33	34	34	35	33	31	G	G	G	G	G	G	G	G	

HOURLY VALUES OF fmin AT Kokubunji

DEC. 2017

LAT. 35°43.0' N LON. 139°29.0' E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	15	14		20	15	14	21	21	17	21	17	18	20	15	14	20	14	17	14	17
2	17	14	14	18	15	15	20	14	17	17	18	17	17	15	18	21	21		20	15	15	17		
3	15	17		17	17	17	20	18	14	17	17	17	20	18	15	17	14	14		18	15	17	18	
4	15	17	15	14	14	15	18	17	14	17	14	20	17	14	14	13	14	14	20	17	17	17	14	15
5	14	14	14	15		15	18	14	14	14	14	17	15	17	15	14	20	14	21	14	14	14	20	18
6	15	14	17	17	17	17	14	18	20	20	17	17	18	17	14	14	17	14	17	17		18	14	15
7	15	14	15	14	14	22	13	18	21	15	14	15	17	17	20	13	13	14	14	15	14	15	17	14
8	17	15	14	14	14	18	17	21	17	17	17	21	17	15	17	13	22	21	14	15	13	14	17	13
9	14	14	14	14	14	17	14	14	14	17	17	21	14	17	14	15	14	14	17	17	14	14	14	15
10	17	17	17	15	17		14	17	14	17	14	17	18	20	17	14	18	14	20	15	14	14	15	14
11	15	20	14	15	14		15	17	14	14	18	17	20	15	13	14	20	13	14	14		18	18	14
12	14	18	17	20	15	14	18	14	14	15	17	17	17	15	15	14	15	14	17	14	13	17	15	18
13	17	15	17	20	15	14	17	18	14	17	17	14	18	18	15	24	21	14	15	15	17	17	15	14
14	15	15	15	14	14	17	15	17	14	14	15	20	22	17	23	17	18	14	21	18	15	14	20	14
15	14	14	15	14	13	15	18	18	14	14	15	14	18	17	17	24	14	17	17	20	18	20	17	14
16	17	17	17	14	14	14		14	13	14	17	17	20	17	15	14	14		15	17	15	15	14	15
17	15	14	15	13	14	14		15	14	14	15	17	15	17	17	13	17	17	15	17	14	14	21	15
18	17	20	17	15	14	14	14	18	21	15	17	15	18	17	14	13	20	14	17	21	13	15	17	15
19	14	14	17	14	17	14	18	17	22	17	15	14	18	15	15	14	17	20	14	13	20	22	18	14
20	17	14	17	18	13	17		18	23	17	18	18	21	20	17	15	14	18	15	18	13	18	15	14
21	18	17	15	14	15	14	14	17	22	29	33	21	22	34	22	26	23	18		14	14	15	18	18
22		15	18	14	21	14	14	17	24	25	21	21	22	23	21	20	20	14		18	20	20	15	
23		15	14	18	21	21	14	14	15	20	22	20		37	17	17	17	17	15	13	14	13	21	17
24	17	14	14	15	14	15	17	14	18	15	38	37	17	17	17	14	21	17	14	13	17	17	14	14
25	13		14	14	14	13	14	17	13	13	14	15	21	18	17	13	18	15	14	17			17	18
26	14	14	14	14	14	14	14	20	14	15	17	20	20	21	18	17	14	17	21	20	21	14	15	17
27	17	14	14	15	20	14	15	14	14	14	18	18	18	17	17	14	21	14	14	17	22	13	15	14
28	17	14	14	17	14	14	14	21	14	22	18	20	20	14	17	20	14	14	18	15	15	15	18	14
29	17	14	17	14	14	14	18	17	14	21	18	20	18	17	18	15	21	14	14	17	14	14	14	17
30	14	14	14	13	14	14	14		18	15	18	17	17	15	15	14	13	14	20	14	13	15	17	15
31	18	15	14	15	17	15	17	14	14	17	17	20	17	17	17	14	14	15	20	15	14	17	18	78
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	30	30	31	30	29	27	30	31	31	31	31	30	31	31	31	31	29	28	31	28	30	30	28
MED	15	14	15	14	14	14	15	17	14	17	17	17	18	17	17	14	17	14	16	17	14	15	17	15
U Q	17	17	17	17	17	17	18	18	18	17	18	20	20	18	17	17	20	17	20	18	17	17	18	17
L Q	14	14	14	14	14	14	14	14	14	14	15	17	17	15	15	14	14	14	14	14	14	14	15	14

HOURLY VALUES OF foF2 AT Yamagawa
 DEC. 2017
 LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	31	31	34	32	31	B	B	36	52	53	68	52	64	66	63	51	60	53	30	32	32		49	N	
2	25	30	A	34	N	N	B	37	54	54	59	49	75	58	61	58	48	47	A	30	34	28	B	N	
3	N	28	30	49	31	29	N	34	53	53	59	56	58	58	54	52	52	48	A	A	30	29	23	26	
4	26	28	B	31	28	18	B	34	44	50	53	50	57	59	51	56	65	44	59	26	49		26		
5	B	25	26	59	B	N	B	32	41	53	70	82	84	76	65	60	169	50	N	31	40	41	26	30	
6	N	26	28	31	30	30	30	39	51	59	72	72	66	63	71	55	63	A	36	29	26	N	B	26	
7	26	30	28	49	31	34	B	34	53	50	55	62	74	65	57	A	A		A	A	A	A	A	A	
8	A		34	42	59	A	B	34	54	53	64	59	65	60	86	A	45	40	36	34	A	A	A	A	
9	A	A	A	A	A	A	A	35	54	54	51		A	A	A	64	58	54	50	30	A	34	34	32	30
10	28	28	30	49	28	30	29	35	52	52	54	58	54	60	54	52	51	44	34	30	B	32	34	A	
11	A	A	30	28	26	N	B	34	55	50	58	61	59	56	66	54	47	52	34	32	B	30	28	32	
12	30	27	49	32	30	30	29	36	52	55	44	56	50	74	75	57	38	47	36	26	35	A	A	26	
13	30	34	34	A	30	B	26	32	44	58	77	69	62	72	72	55	60	45	34	B	30	31	N	28	
14	34	34	34	32	32	30	N	35	54	N	56	52	68	68	67	51	51	46	32	30	B	30	28	30	
15	30	32	31	30	30	31	49	36	52	54	58	50	73	74	57	55	71	A	37	49	30	N	28		
16	25	28	30	28	30	26	49	36	N	53	58	52	64	55	47	56	54	46	34	28	32	32	32	30	
17	28	37	40	31	34	24	N	32	45	52	52	54	55	55	60	53	56	42	59	35	34	35	49	26	
18	30	37	30	28	30	N	B	34	54	64	58	62	72	78	A	55	A	50	40	37	26	34	N	B	
19	N	28	29	49	54	31	28	30	52	52	55	55	64	70	57	68	55	N	A	34	59	59	A	B	
20	A	29	49	N	28	30	A	49	45	54	52	55	71	62	64	55	68	45	30	28	34	36	B	26	
21	30	B	28	28	28	29	29	30	54	54	56	58	58	55	55	52	53	44	28	28	32	34	32	26	
22	30	31	26	28	28	59	49	49	51	51	55	54	62	72	69	58	57	49	A	B	28	29	26	28	
23	28	28	26	30	34	30	28	34	47	50	53	47	48	51	A	66	57	47	40	36	59	28	N	25	
24	28	28	31	26	30	30	35	32	40	50	47	50	74	87	56	55	57	51	38	30	34	36	40	34	
25	32	35	32	31	36	25	N	34	52	46	62	78	67	67	45	58	54	55	51	N	N	28	N	28	
26	A	26	27	28	28	30	49	49	33	44	54	72	67	66	55	50	56	55	32	30	34	N	30	49	
27	31	34	B	28	31	28	B	30	54	54	55	57	68	82	A	54	54	36	A	30	49	N	28	25	
28	30	31	30	30	42	29	N	28	48	50	60	64	55	58	63	68	64	40	A	A	26	A	A	25	
29	A	26	26	28	25	B	N	30	54	54	54	66	68	52	54	46	A		A	A	A	A	A	26	
30	25	28	28	26	31	32	B	26	51	51	54	58	62	60	66	53	159	36	34	30	34	31	N	26	
31	28	26	28	26	30	30	A	30	54	51	54	52	45	68	61	54	54	A	A	59	49	34	37	A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	21	27	27	28	28	22	12	31	30	30	31	30	30	30	28	29	28	26	21	23	24	21	16	22	
MED	30	28	30	30	30	30	30	34	52	53	55	56	64	64	61	55	56	46	34	30	34	32	31	27	
U Q	30	32	34	33	31	30	49	36	54	54	59	62	68	72	66	58	61	50	39	34	37	34	35	30	
L Q	27	28	28	28	28	29	28	32	47	50	54	52	58	58	55	52	52	44	32	29	31	29	27	26	

HOURLY VALUES OF fEs AT Yamagawa

DEC. 2017

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	G	G	26	G	G	B	B	G	52	49	39	44	51	46	53	34	G	G	25	26	G	G	G	G
2	G	G	36	34	G	G	B	26	27	38	40	44	43	49	56	56	63	54	33	G	30	G	B	G
3	G	G	G	G	G	G	G	G	49	49	43	35	46	44	41	40	31	32	27	32	G	G	G	G
4	G	G	B	G	G	33	B	33	28	32	65	45	49	47	42	33	29	46	G	23	G	G	G	G
5	B	G	G	26	B	G	B	30	35	38	43	53	46	45	52	148	49	24	34	G	G	11	G	G
6	G	G	G	G	G	G	G	G	28	32	34	37	37	40	35	56	33	57	26	27	G	G	B	G
7	G	G	G	G	G	G	B	G	48	44	33	50	39	41	39	61	75	54	48	33	32	26	57	70
8	94		G	11	24	26	B	G	50	30	37	40	53	68	78	76	57	37	29	41	70	58	57	41
9	32	40	40	36	30	32	28	28	34	38	40	70	92	110	46	43	41	59	28	40	26	27	G	G
10	G	G	G	G	G	32	27	38	28	33	45	46	42	41	39	39	71	30	G	G	B	G	G	43
11	38	57	G	G	G	G	B	G	33	34	43	46	46	45	47	33	34	28	35	G	B	G	G	G
12	G	G	G	G	G	G	G	G	31	38	43	47	45	44	41	40	44	31	G	46	28	48	32	G
13	G	G	41	41	26	B	G	G	36	32	41	40	69	44	57	40	32	G	32	B	G	G	G	G
14	G	G	G	G	G	G	G	G	34	32	36	46	40	42	49	61	46	25	G	G	G	G	G	G
15	G	G	G	G	G	G	G	G	29	33	40	46	38	45	44	39	52	53	32	G	B	G	G	G
16	G	28	26	G	G	G	G	G	28	32	56	56	45	47	51	35	33	71	35	G	G	G	G	24
17	G	26	28	G	G	G	G	G	48	60	40	52	46	35	41	42	48	33	G	28	30	27	G	G
18	G	G	G	G	G	G	B	G	29	37	42	44	44	56	92	83	84	37	34	32	G	G	G	B
19	G	G	G	G	G	G	G	G	26	32	34	42	40	44	41	52	28	G	27	G	G	G	54	B
20	26	30	G	G	G	19	25	28	28	34	36	42	44	64	61	55	33	40	26	27	28	G	B	G
21	G	B	G	G	G	G	G	G	48	39	36	42	35	40	38	34	32	34	33	G	G	G	G	G
22	G	G	G	G	G	G	G	G	G	28	47	40	72	56	54	50	28	28	28	B	G	G	G	G
23	G	G	G	G	G	G	G	G	32	36	50	44	45	45	67	39	31	43	40	G	G	G	G	G
24	G	G	G	G	24	G	26	G	29	43	40	46	39	37	38	35	34	35	G	G	G	G	G	G
25	G	G	G	G	G	G	G	G	26	36	43	48	61	60	57	48	29	32	48	G	G	G	G	G
26	29	G	G	G	G	39	G	31	55	40	33	35	G	43	47	61	29	26	G	G	G	G	G	G
27	G	G	B	G	G	G	B	23	29	36	45	54	49	64	109	45	40	39	55	G	G	G	G	G
28	G	G	G	G	G	G	G	24	46	38	41	33	42	43	41	41	40	70	34	58	54	70	33	56
29	40	G	G	G	G	B	G	G	29	36	36	42	43	40	45	45	50		70	58	48	34	30	G
30	G	G	G	G	G	36	B	G	43	31	39	40	51	78	40	46	48	36	G	G	71	26	G	G
31	25	G	G	G	G	G	36	27	37	32	153	43	44	39	40	44	33	74	43	27	G	26	28	25
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	29	31	30	28	21	31	31	31	31	31	31	31	31	31	31	30	31	29	28	31	28	29
MED	G	G	G	G	G	G	G	G	32	36	40	44	45	45	46	44	34	36	29	G	G	G	G	G
U Q	G	G	G	G	G	10	13	26	46	38	43	47	49	56	56	56	49	53	35	32	29	26	14	G
L Q	G	G	G	G	G	G	G	G	28	32	36	40	40	41	41	39	31	28	G	G	G	G	G	G

HOURLY VALUES OF fmin AT Yamagawa

DEC. 2017

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	15	15	B	B	15	14	15	20	20	17	18	21	18	23	18	17	15	14	26	20	21
2	18	17	14	14	15	15	B	14	15	15	16	20	17	15	18	17	15	14	14	15	14	14	B	18
3	14	15	14	14	15	14	18	14	14	14	15	17	15	18	17	17	15	14	15	14	15	18	18	14
4	15	14	B	14	14	14	B	14	15	15	15	16	16	18	18	16	14	17	14	14	14	17	16	66
5	B	14	14	15	B	16	B	14	14	14	14	16	17	15	16	15	14	15	15	16	14	14	66	14
6	15	15	15	15	15	16	14	15	15	15	14	15	17	20	17	14	15	15	15	14	14	14	B	14
7	15	15	15	14	14	14	B	15	18	14	15	15	17	20	17	16	15	14	15	14	14	16	14	14
8	14		14	14	16	15	B	14	15	15	16	15	20	18	17	15	15	15	14	14	14	14	14	15
9	15	14	14	15	14	14	15	14	14	14	14	15	15	17	17	16	15	15	14	14	14	15	14	15
10	16	14	14	14	15	15	14	14	18	14	14	14	14	17	20	17	15	14	14	15	B	14	15	14
11	14	15	17	15	15	15	B	14	14	15	14	15	16	15	17	15	14	14	14	14	B	14	15	15
12	15	14	20	15	14	14	15	15	16	15	15	15	20	17	17	18	17	15	14	16	14	14	15	15
13	15	15	14	14	14	B	16	14	14	15	15	17	17	20	16	15	15	18	14	B	15	15	15	17
14	15	14	15	15	15	15	15	14	14	15	14	16	15	18	15	15	15	17	14	15	14	15	14	15
15	14	14	15	14	14	15	16	14	14	15	14	16	20	20	18	15	15	15	14	14	B	14	16	15
16	18	14	15	14	14	14	14	14	14	14	14	17	18	15	14	15	15	14	14	18	14	14	14	15
17	15	14	15	15	14	15	14	14	14	14	15	14	15	14	18	15	15	15	18	14	14	14	15	18
18	15	15	14	14	15	14	B	21	14	14	15	15	17	16	17	15	14	14	14	14	15	14	17	B
19	15	15	15	14	16	15	14	14	17	14	15	18	16	15	15	15	15	18	15	14	14	16	15	B
20	18	16	16	15	15	15	16	16	14	14	15	18	17	18	20	16	17	15	14	16	14	15	B	14
21	16	B	15	14	14	14	15	14	15	16	15	20	21	21	18	18	24	18	15	18	15	15	17	21
22	15	15	17	15	21	14	15	14	21	15	21	21	22	20	17	17	21	14	14	B	14	14	15	14
23	15	17	14	15	14	15	15	15	17	15	17	20	17	18	16	15	15	15	14	14	14	14	15	14
24	14	15	14	14	14	15	15	14	15	15	16	17	18	16	17	17	15	14	14	15	14	14	15	15
25	14	15	14	15	14	15	15	15	18	14	15	15	16	17	18	16	15	15	14	15	15	14	14	15
26	14	15	17	14	15	14	14	14	14	14	14	17	16	20	16	15	16	17	14	14	17	16	15	14
27	15	15	B	14	15	15	B	14	15	15	16	16	18	18	20	18	15	15	16	14	18	16	15	14
28	15	14	15	14	14	14	15	15	17	15	15	18	20	15	18	17	18	14	14	14	14	14	14	15
29	14	14	14	14	15	B	16	14	14	14	14	16	15	16	16	15	14		14	15	14	14	14	14
30	15	15	15	14	15	14	B	14	18	15	14	14	17	16	15	15	15	15	14	15	14	14	15	14
31	14	15	14	14	15	14	14	17	14	14	15	17	20	15	15	14	14	14	14	15	15	15	15	17
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	29	29	31	30	28	21	31	31	31	31	31	31	31	31	31	31	30	31	29	28	31	28	29
MED	15	15	15	14	15	15	15	14	15	15	15	16	17	17	17	15	15	15	14	14	14	14	15	15
U Q	15	15	15	15	15	15	15	15	17	15	15	18	18	18	18	17	15	15	15	15	15	15	15	16
L Q	14	14	14	14	14	14	14	14	14	14	14	15	16	15	16	15	15	14	14	14	14	14	14	14

HOURLY VALUES OF foF2 AT Okinawa
 DEC. 2017
 LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	29	30	29	31	32	A	B													A				N	
2	30	30	34	40	28		B							A		A				A	A	A	A	28	
3	28	29	31	40	38	41	23	37	47	65	48	63	54	42	62	64	64	39	38		A		25	26	32
4	N		25	26	31	30	N	B													A	N	N		28
5	N	N		26	35	N	A	B																	32
6	46	34		30	34	28	32	42		A															32
7	N		28	29	29	42	N	B													A	A	A	A	26
8	25	30	32	48		A	A																A	A	B
9	26	28		A	A			28	38	34	59	62	55	60		A									28
10	26	N		26	30	26	34	29	34	47	52	63	61	65	58	55	60	50	48	46	47	38	30	32	N
11	N	A	A	N	N	N	B																		A
12	30	26	34	32		A	30	28	34	51	60	64	54	64	66	81	80	60	55	42					26
13	N		30	30	28	59	B	N																	N
14	N	A		31	20	29	28																		N
15	26	N	A		28	59	30	32	32	50	51	63	61	61	86	86	86	81		A					30
16	N	A		28	29	31	32	26	31	55	60	57	135	56	67	60	60	60	52	40	49		N	N	28
17	30	31	39	34	34	26	N														A				N
18	28	A		38	49	28	N																		B
19	N	N	N		28	28	34	B																	A
20	28	29	49	59	30	32																			A
21	B	B	B	N			B																		B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B										B
23	N	N	N		25	26	32	N																	N
24	28	31	32	26	28	34																			N
25	32	37	34	30	38	27	N																		N
26	N	N	B	N																					N
27	28	23	28	28	30	29	B																		N
28	N		26		26	32	25	B																	N
29	A	A		N	A		A																		N
30	26	28	28	30	40		N	A																	N
31	A	A	A		32	37	34	A																	N
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	16	17	20	25	24	19	9	30	29	28	29	28	28	26	25	28	27	28	29	22	19	19	20	13	
MED	28	29	30	30	30	30	28	32	51	60	62	61	64	72	70	66	64	58	45	38	38	34	30	28	
U Q	30	30	34	34	37	34	32	35	54	64	66	69	71	85	80	73	70	65	52	46	42	41	34	30	
L Q	26	27	28	28	28	28	26	29	47	53	57	56	59	58	62	60	59	47	40	35	34	30	28	26	

HOURLY VALUES OF fEs AT Okinawa

DEC. 2017

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	30	G	G	G	G	28	B	G	31	33	46	54	42	55	78	53	52	48	36	36	28	G	G	G	
2	G	G	G	G	11	G	B	24	28	35	53	86	83	105	104	97	60	44	32	69	92	45	28	G	
3	G	G	G	G	G	44	101	G	28	55	43	47	52	49	54	46	38	49	32	36	26	25	G	G	
4	G	G	G	G	11	G	B	G	108	42	40	46	48	46	44	44	38	28	36	28	29	24	G	97	
5	G	G	G	11	20	93	B	27	36	40	46	58	54	69	56	46	50	27	30	24	G	G	G	G	
6	G	G	26	32	G	24	26	G	60	36	37	46	42	76	49	56	44	46	24	29	26	G	G	G	
7	G	G	G	G	G	G	B	G	28	128	39	39	41	54	55	44	45	54	36	55	43	35	44	26	
8	G	G	28	36	G	28	28	26	29	38	41	40	70	61	130	80	34	44	35	39	34	31	26	B	
9	G	G	28	58	54	44	G	30	32	54	40	42	46	143	130	54	51	58	53	29	31	25	G	G	
10	G	G	G	G	26	G	G	34	106	54	111	46	49	40	41	41	33	34	29	43	G	G	G	G	
11	G	43	58	G	G	G	B	G	31	39	42	75	70	71	136	44	39	48	24	39	G	G	27	26	
12	G	G	G	26	90	27	G	28	32	40	44	45	45	44	46	44	38	33	36	45	34	28	G	G	
13	G	G	G	G	G	B	G	23	180	34	44	47	57	48	86	37	36	27	40	26	32	153	G	G	
14	G	32	G	90	G	G	G	G	34	58	43	132	48	47	38	37	73	41	36	25	60	31	G	26	
15	G	25	28	26	G	G	G	G	31	48	40	47	50	52	62	42	40	74	47	30	G	G	32	G	
16	G	38	G	G	G	G	G	11	28	32	40	45	116	45	37	43	39	27	40	28	G	G	G	G	
17	G	G	26	G	30	160	11	25	45	38	44	43	44	38	41	39	70	61	35	23	24	24	28	G	
18	70	39	25	G	25	G	G	G	29	40	44	42	40	46	44	58	57	46	34	27	25	G	G	B	
19	G	G	G	G	G	G	B	G	46	36	38	38	45	46	46	44	40	33	25	34	G	59	36	26	
20	G	G	G	G	G	G	G	G	28	53	40	38	39	50	42	67	49	56	91	36	25	G	26	26	
21	B	B	B	G	G	G	B	G	28	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	56	53	27	49	23	27	G	G	G	
23	G	G	G	G	G	11	G	G	47	71	39	43	46	45	47	45	56	49	11	23	27	G	27	G	
24	G	G	G	G	G	G	36	170	33	145	145	46	40	38	46	41	33	28	48	25	G	G	G	G	
25	G	G	G	G	G	32	G	G	26	40	44	59	63	56	58	45	34	26	11	38	G	G	G	G	
26	G	G	B	G	G	G	G	G	174	32	40	42	45	49	74	86	89	28	25	G	G	21	G	G	
27	G	G	G	G	G	G	B	G	30	36	40	67	92	50	68	55	115	49	41	33	25	G	G	G	
28	G	G	G	G	G	G	B	G	26	130	39	41	45	46	48	44	44	35	36	25	91	56	58	55	
29	28	31	G	G	27	G	25	G	30	46	38	92	180	46	55	58	48	28	48	38	33	G	G	G	
30	G	G	G	G	G	G	24	G	167	34	53	40	54	62	68	92	84	54	32	28	G	G	G	B	
31	110	28	55	29	G	G	58	G	31	51	40	41	56	47	45	39	46	40	43	54	40	28	28	26	
CNT	29	29	28	30	30	29	20	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	30	27	
MED	G	G	G	G	G	G	G	G	31	40	41	46	48	49	54	45	46	42	36	30	26	G	G	G	
U Q	G	13	26	25	20	27	25	24	46	54	44	56	60	58	71	56	56	49	41	38	33	28	28	26	
L Q	G	G	G	G	G	G	G	G	28	36	40	41	44	46	44	43	38	28	30	25	G	G	G	G	

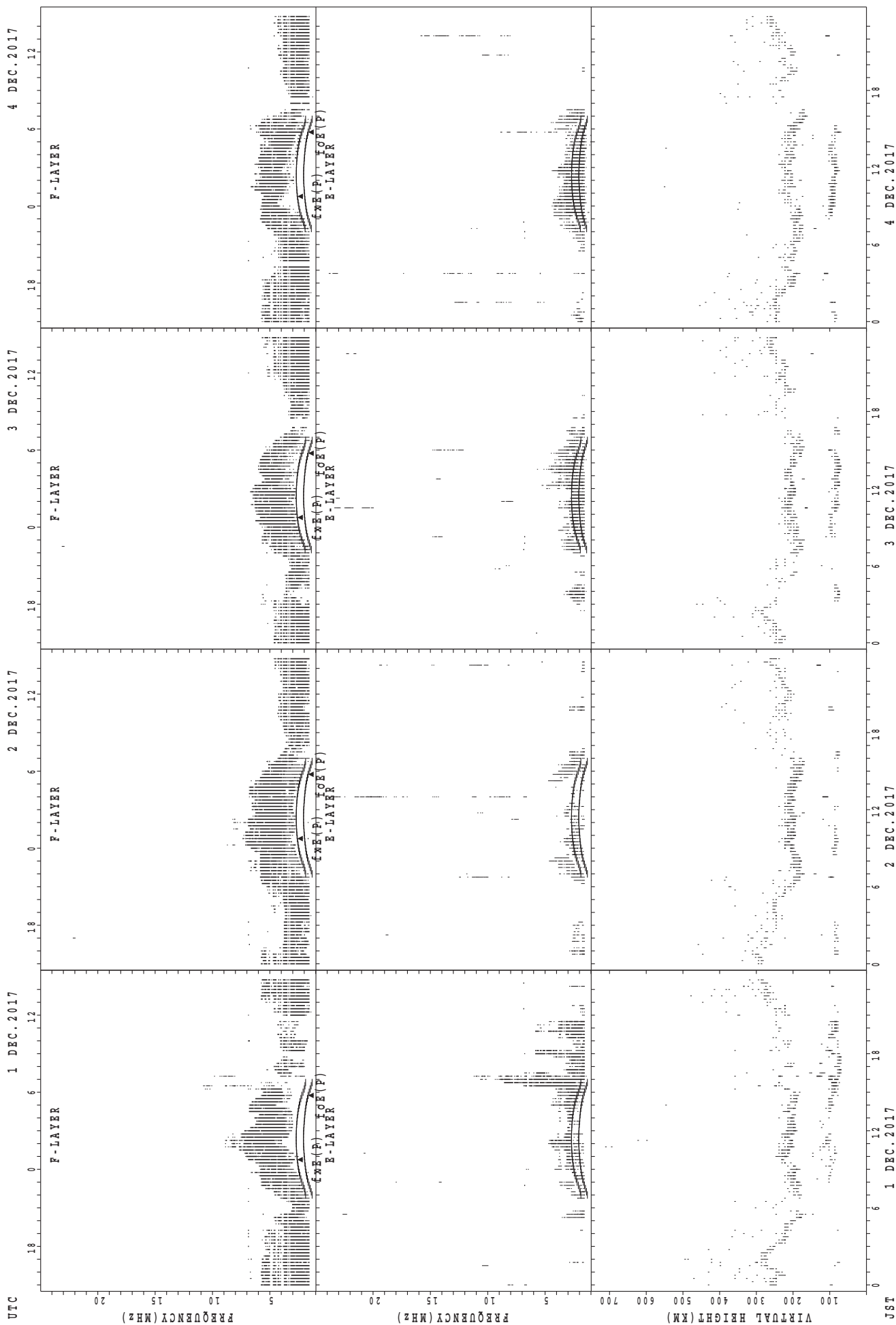
HOURLY VALUES OF fmin AT Okinawa

DEC. 2017

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz AUTOMATIC SCALING

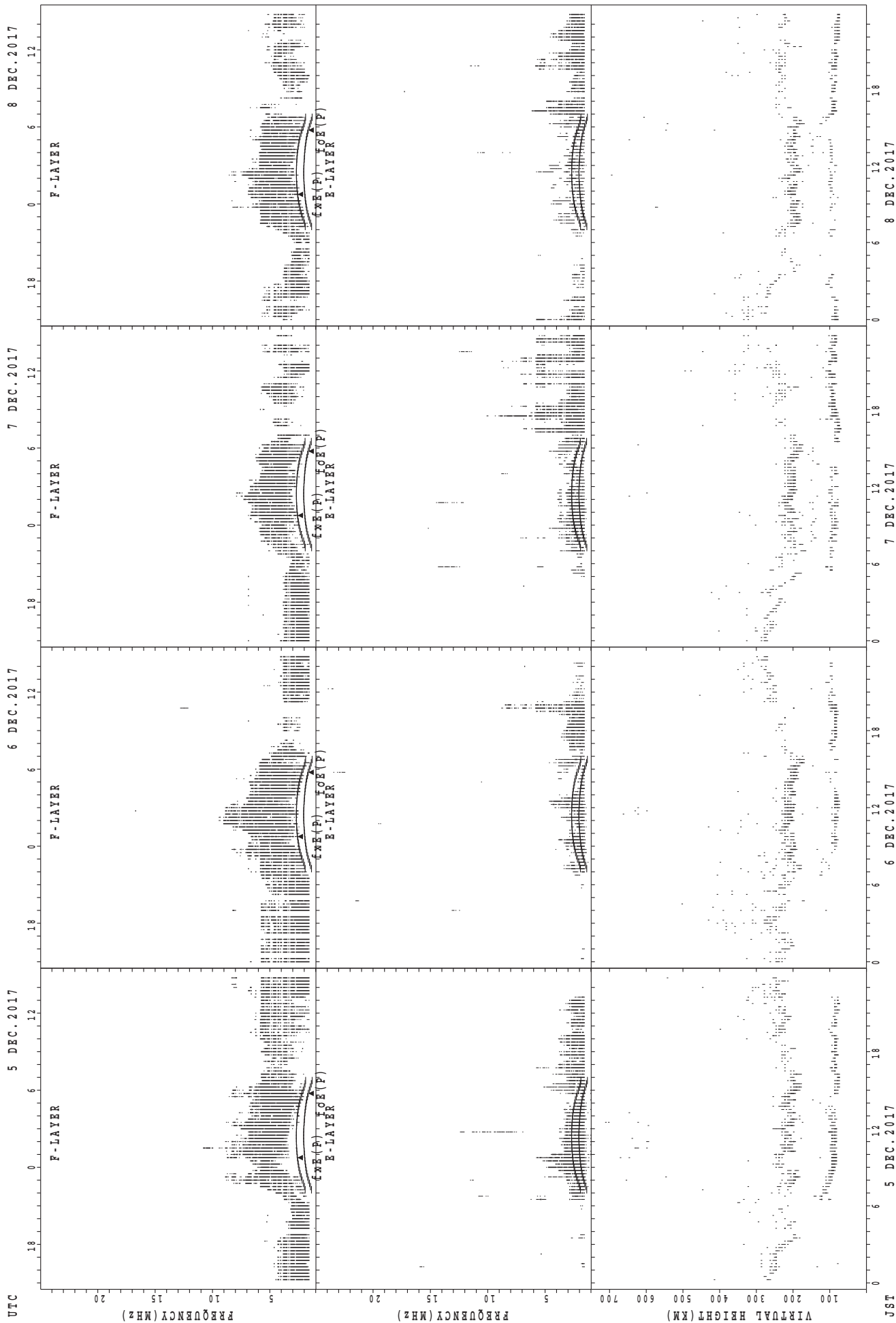
$\begin{matrix} H \\ D \end{matrix}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	14	14	14	14	14	14	B	15	15	17	15	17	17	17	14	15	15	18	14	14	14	14	15	14
2	14	14	14	14	14	15	B	14	14	14	15	14	16	16	14	15	14	14	14	14	14	14	14	15
3	15	14	14	14	14	14	14	14	14	14	14	16	14	17	15	14	14	14	14	14	14	15	14	14
4	14	14	14	15	14	14	B	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	15	14
5	14	14	14	14	15	40	B	14	14	14	14	14	15	14	15	14	14	14	14	14	16	14	14	14
6	15	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14	18	14
7	14	14	14	14	14	14	B	14	15	14	14	14	14	18	14	14	14	14	14	14	14	14	14	15
8	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	B
9	15	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14	14	14	14	14
10	14	17	14	15	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14
11	17	14	14	15	14	15	B	14	14	14	14	14	14	14	14	14	14	14	14	14	14	15	14	14
12	14	15	14	14	14	14	14	17	14	14	14	14	14	14	14	14	14	14	14	14	14	14	18	14
13	20	14	14	14	14	B	14	14	14	14	14	14	14	15	14	15	14	15	14	14	15	14	14	14
14	14	15	16	14	14	15	14	14	14	15	14	14	14	14	14	14	14	14	14	15	14	14	14	14
15	14	14	14	14	14	14	14	14	14	14	15	16	18	14	15	14	14	14	14	14	14	14	14	14
16	18	14	14	14	14	15	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
17	14	14	15	14	14	14	14	14	14	14	14	15	15	14	14	14	14	14	14	14	14	14	14	14
18	14	14	14	14	15	17	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	15	15	B
19	15	14	14	14	14	15	B	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14
20	14	15	14	14	14	14	17	14	14	14	14	15	15	16	15	14	14	14	14	14	14	14	14	14
21	B	B	B	15	14	14	B	15	14	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
22	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	14	14	14	14	14	14	14	14	16
23	14	14	14	14	14	14	15	14	20	14	14	17	15	15	14	15	14	16	14	16	14	14	14	15
24	14	14	14	14	14	15	14	104	17	14	14	15	14	14	14	14	15	14	14	15	16	15	14	14
25	14	14	14	15	14	14	14	14	16	14	14	14	14	16	14	14	14	14	14	14	14	14	14	15
26	14	15	B	14	14	14	14	14	15	14	14	14	14	15	14	14	14	14	14	15	14	14	14	14
27	14	17	15	15	15	14	B	14	14	14	14	14	15	15	15	14	14	14	14	15	15	14	15	17
28	14	14	15	14	14	14	B	14	16	14	15	14	16	17	15	14	14	16	14	15	15	14	14	14
29	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
30	14	14	14	15	14	14	14	14	14	15	14	14	14	15	14	14	14	14	14	14	14	14	14	B
31	14	14	14	14	14	14	15	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	29	29	28	30	30	29	20	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	30	27
MED	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
U Q	14	14	14	15	14	15	14	14	14	14	14	14	15	15	14	14	14	14	14	14	14	14	14	14
L Q	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

SUMMARY PLOTS AT Wakkanai



foE(P); PREDICTED VALUE FOR foE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

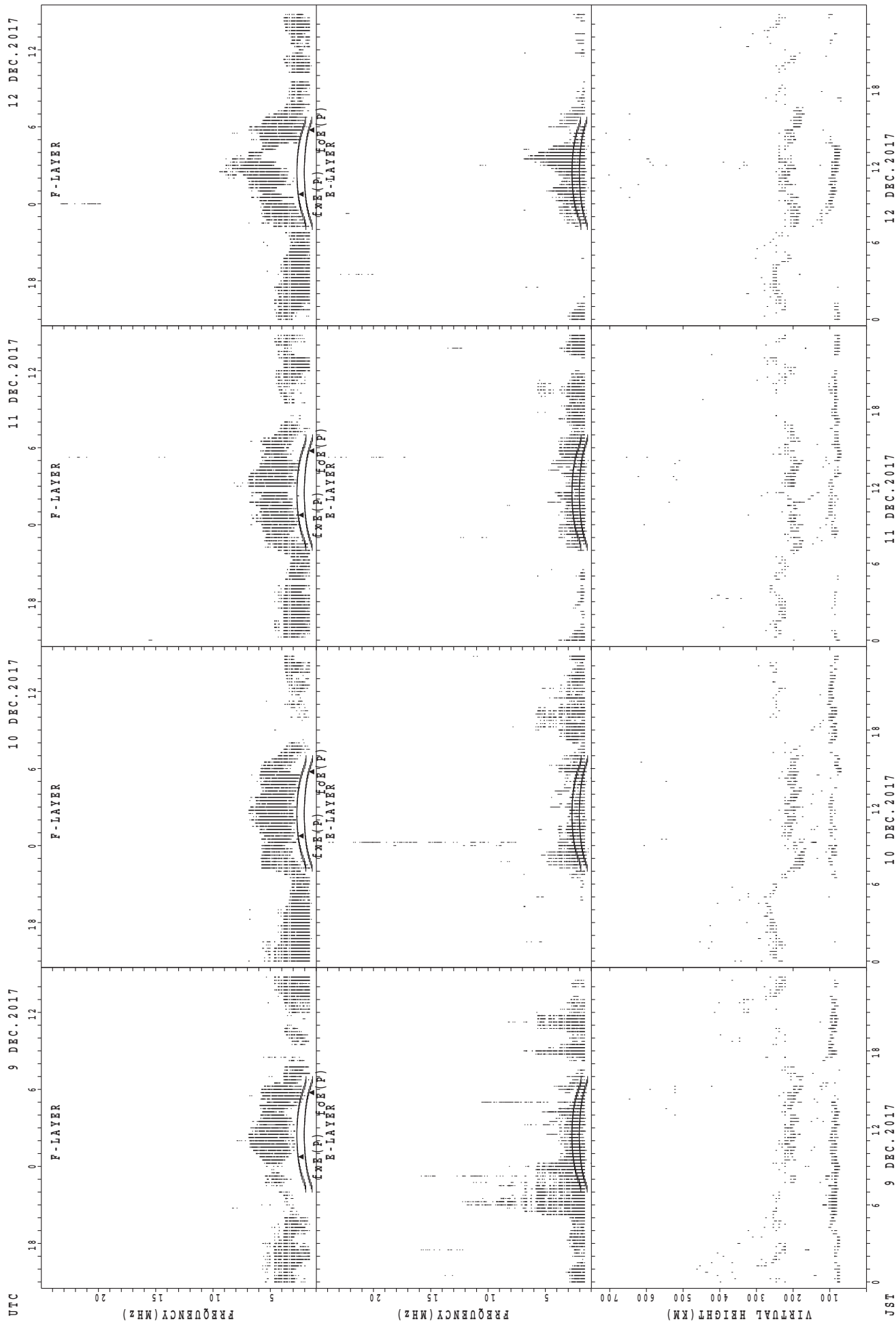
JST 5 DEC.2017

6 DEC.2017

7 DEC.2017

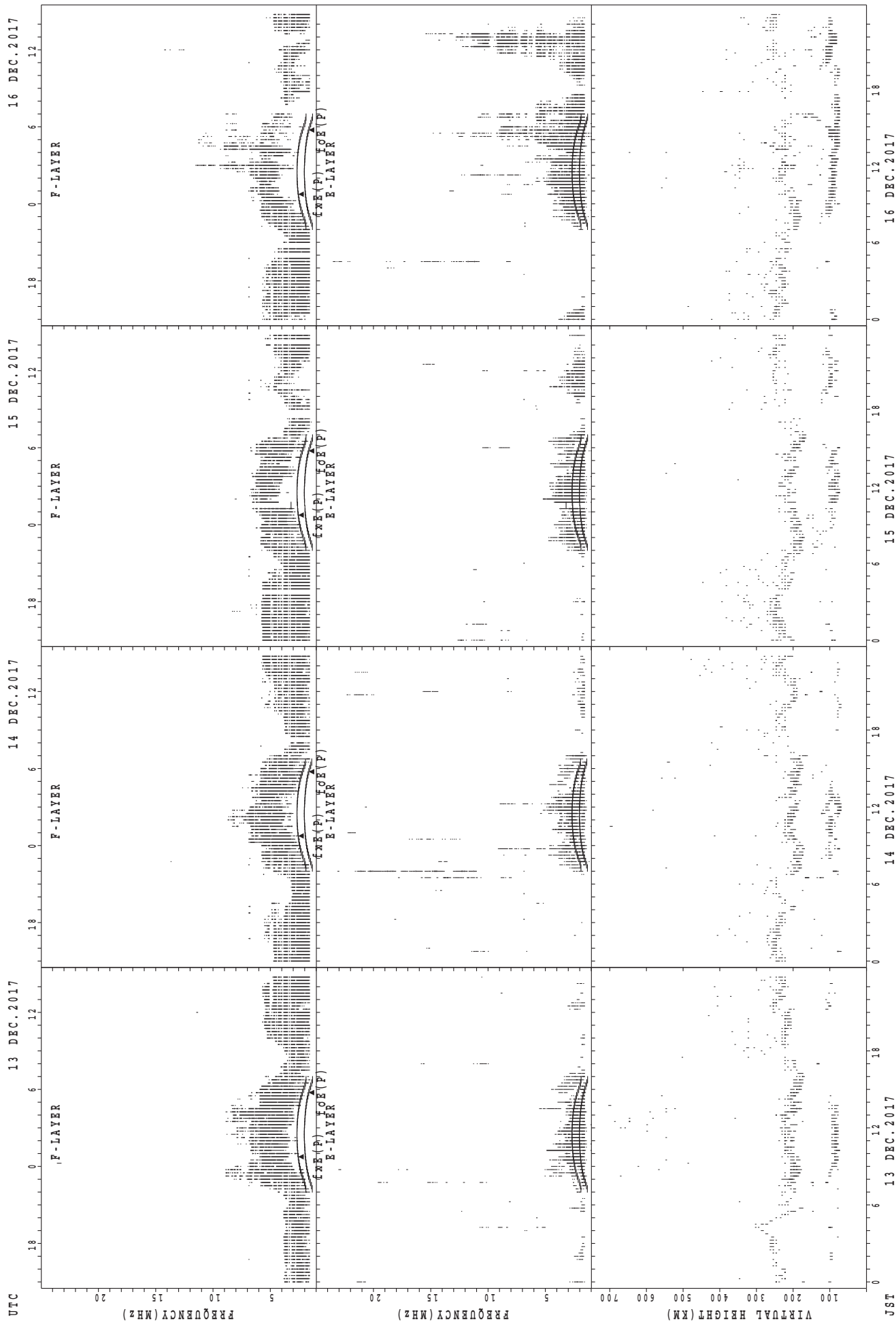
8 DEC.2017

SUMMARY PLOTS AT Wakkanai



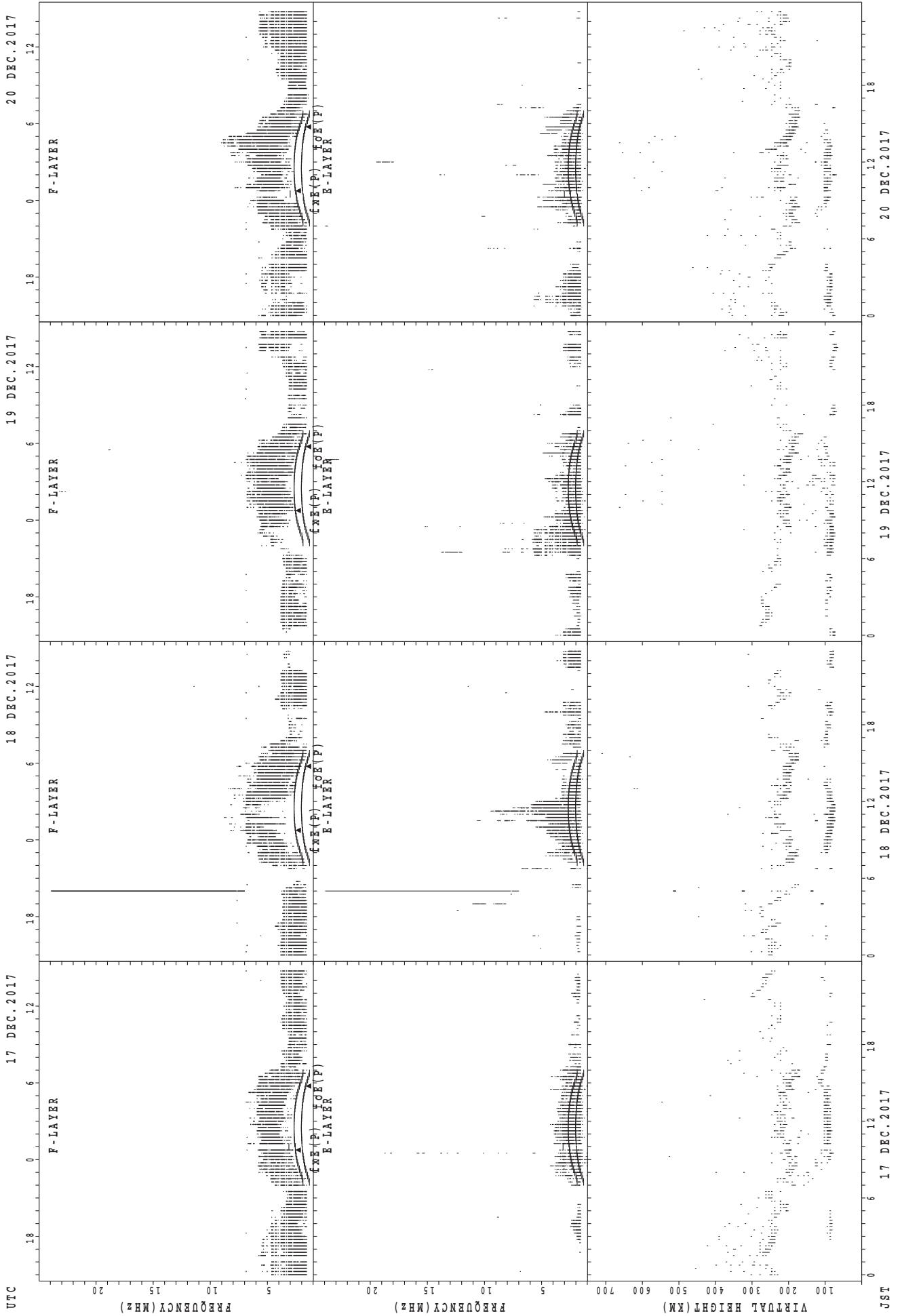
foE(P); PREDICTED VALUE FOR foE
foF2(P); PREDICTED VALUE FOR foF2

SUMMARY PLOTS AT Wakkanai



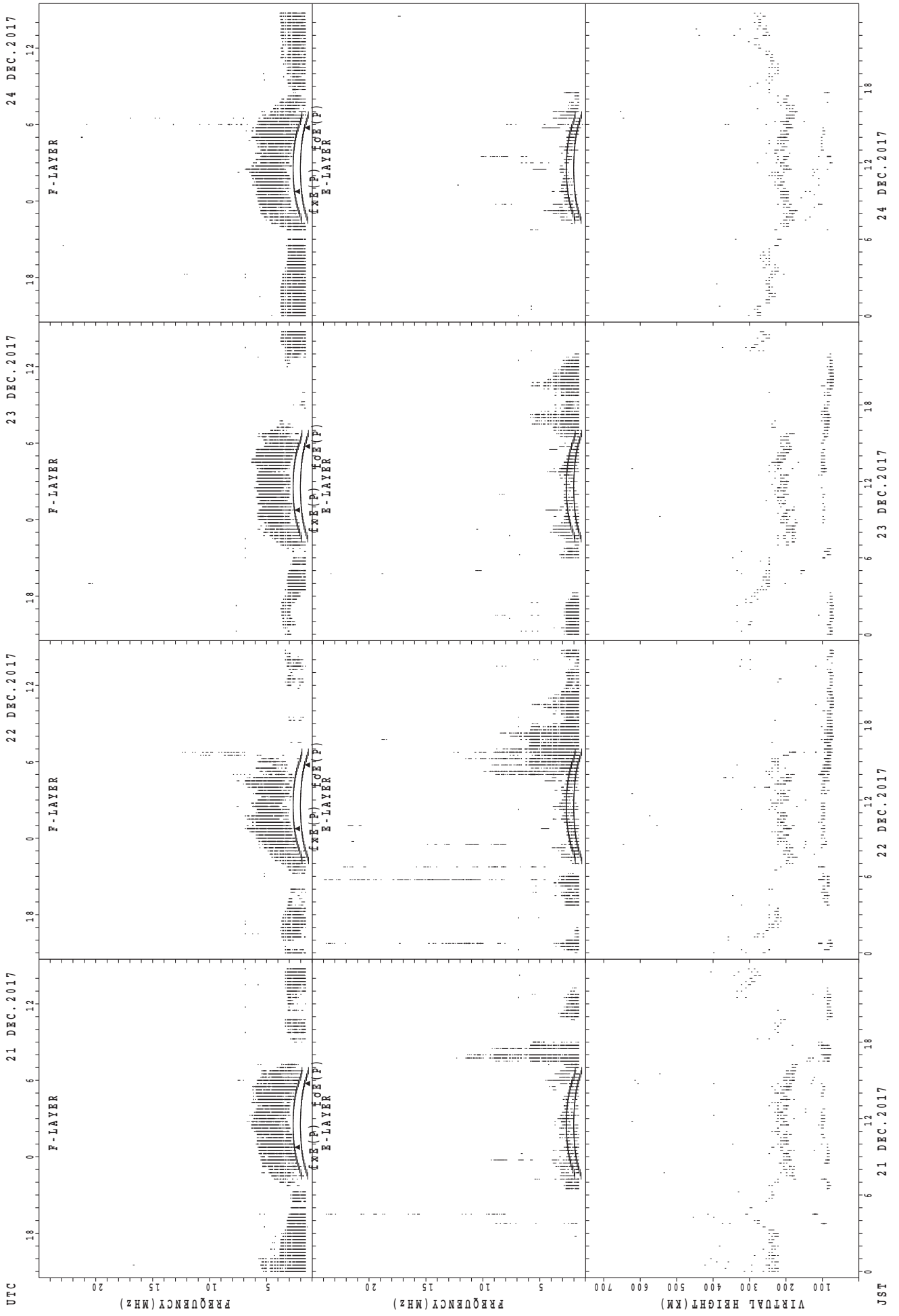
fxE(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



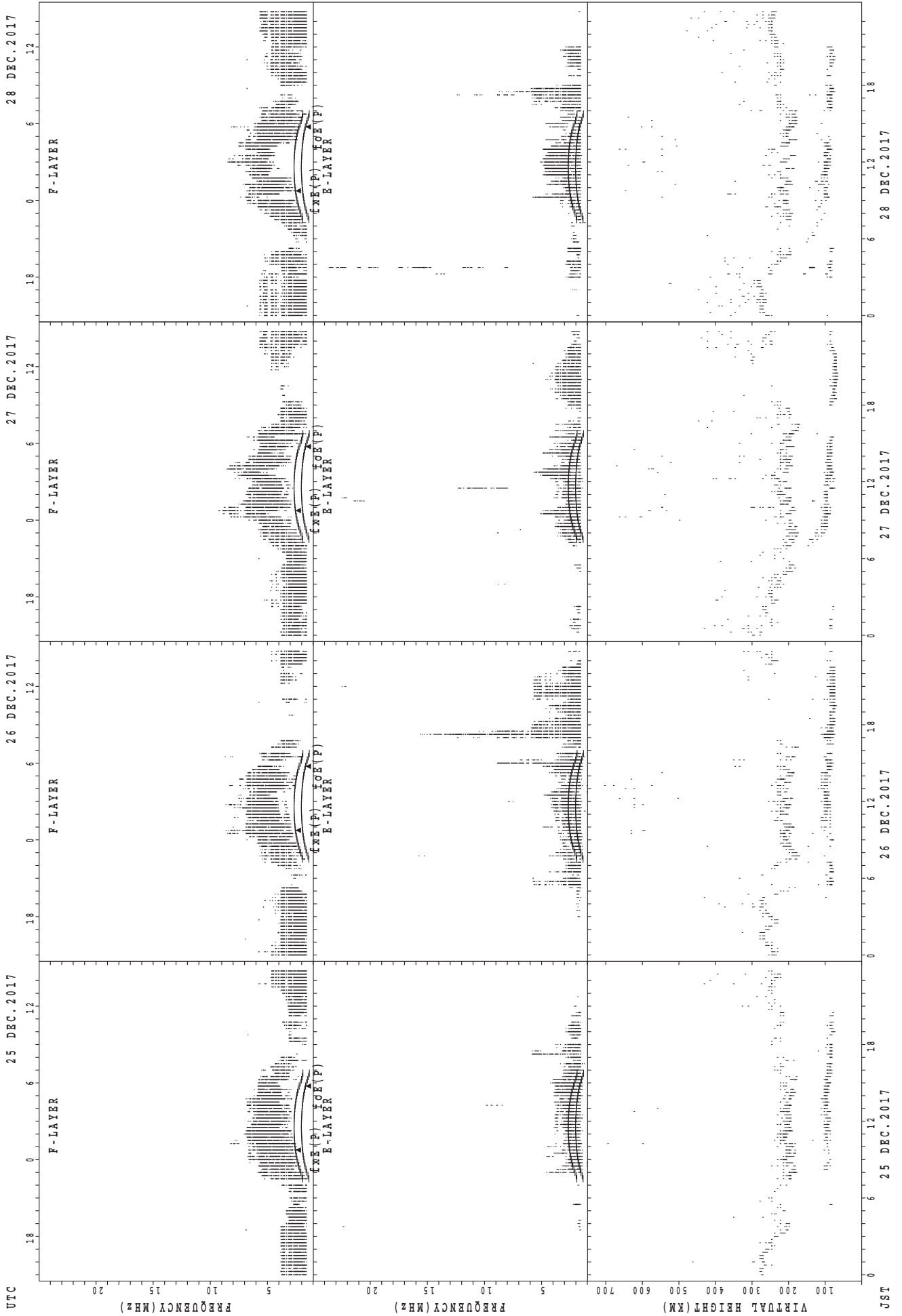
foE(P); PREDICTED VALUE FOR foE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



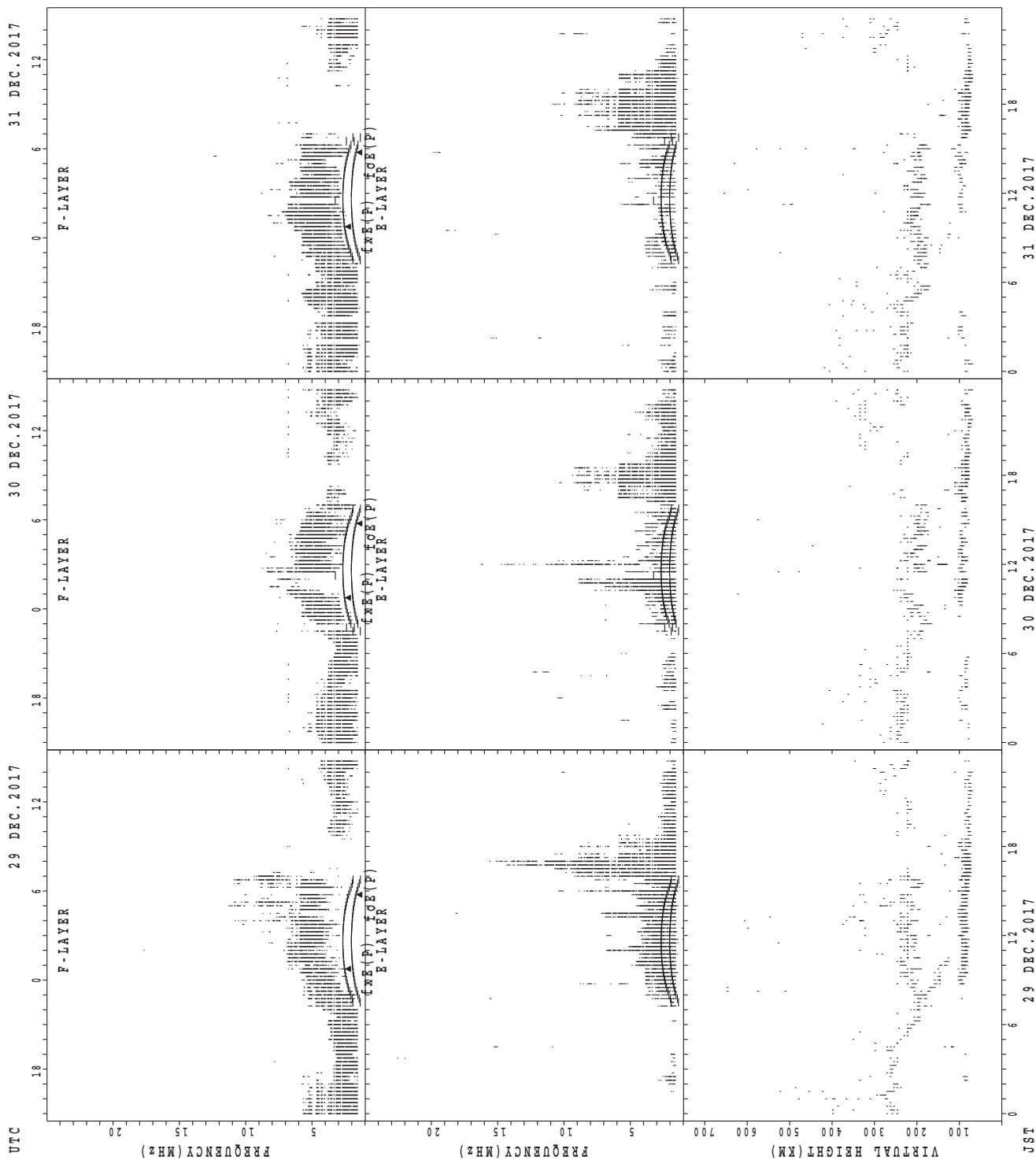
fxE(P); PREDICTED VALUE FOR fxE
fOF(P); PREDICTED VALUE FOR fOF

SUMMARY PLOTS AT Wakkanai



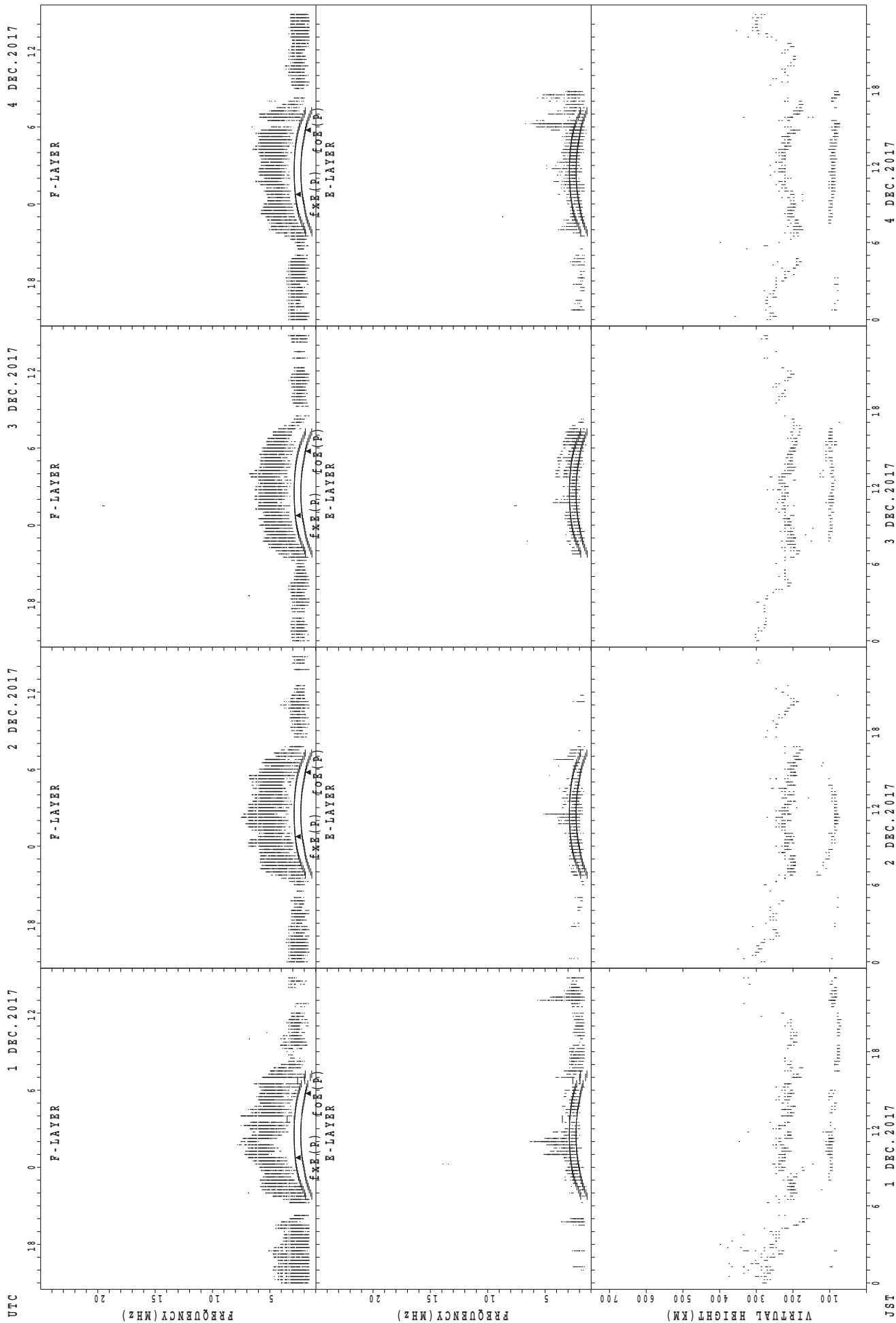
fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Wakkanai



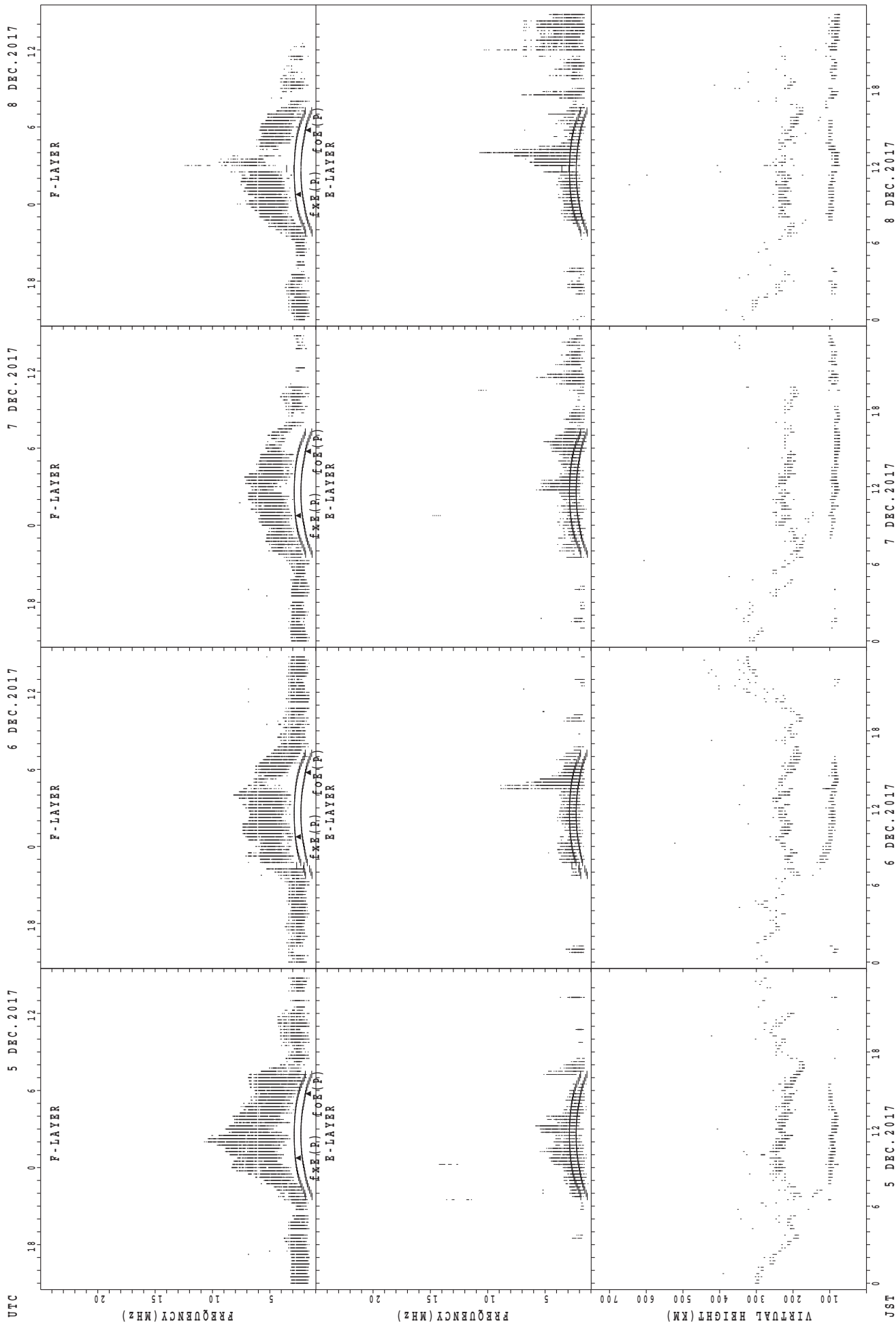
fXe(P); PREDICTED VALUE FOR fXe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



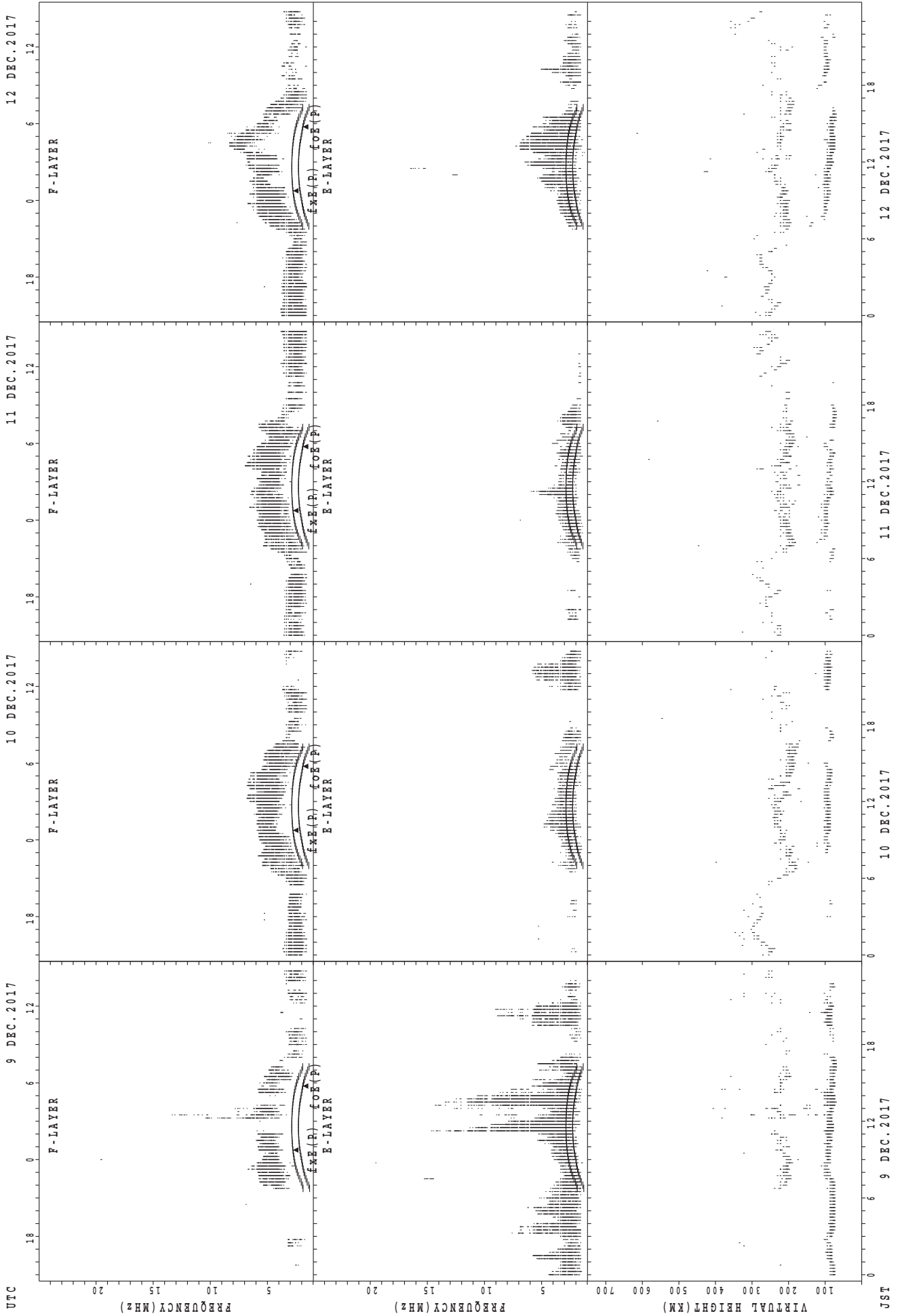
f_xE(P); PREDICTED VALUE FOR f_xE
f_oE(P); PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Kokubunji



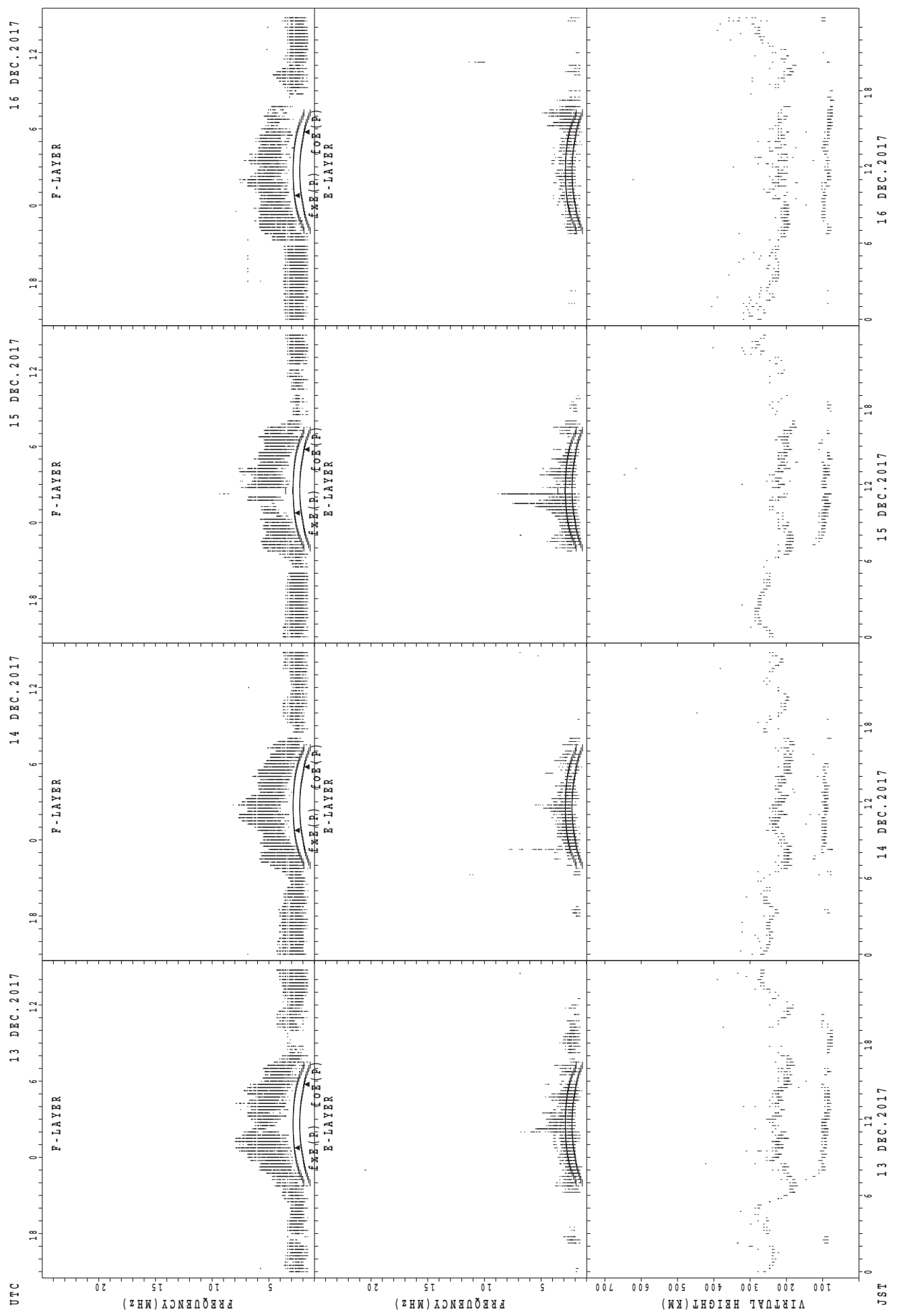
fxe(p); PREDICTED VALUE FOR fxe
foe(p); PREDICTED VALUE FOR foe

SUMMARY PLOTS AT Kokubunji



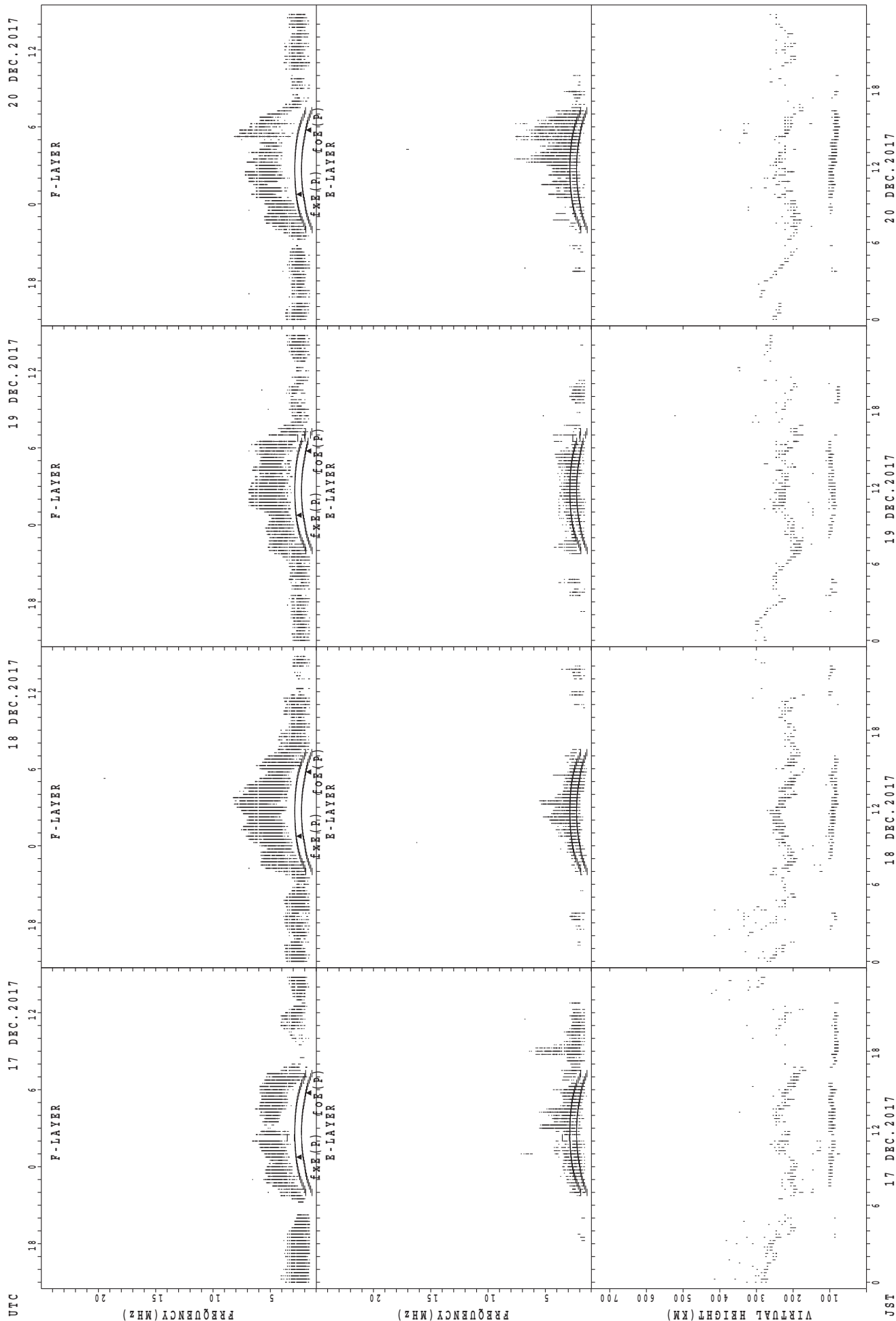
fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



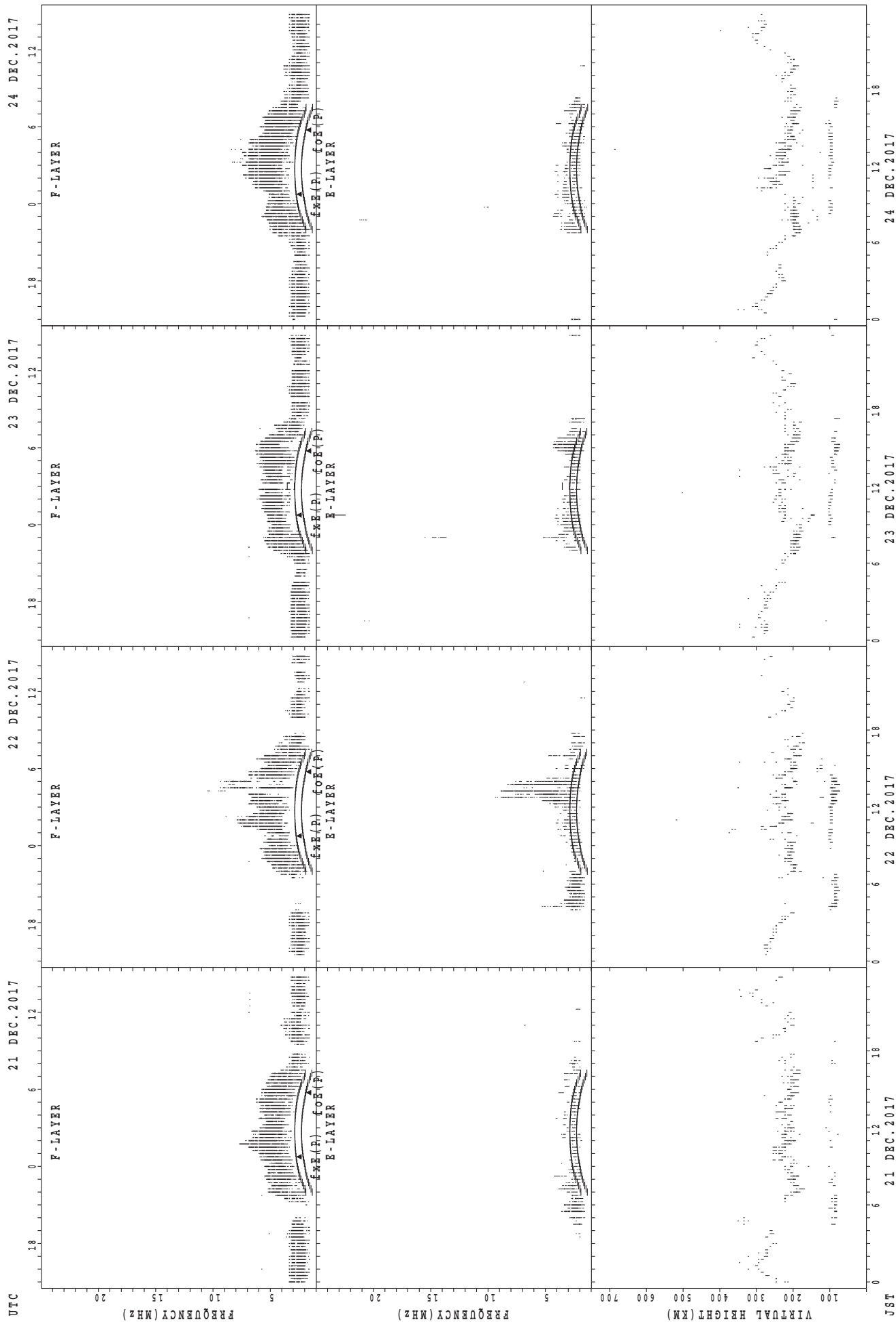
foE(P); PREDICTED VALUE FOR foE
foF(P); PREDICTED VALUE FOR foF

SUMMARY PLOTS AT Kokubunji



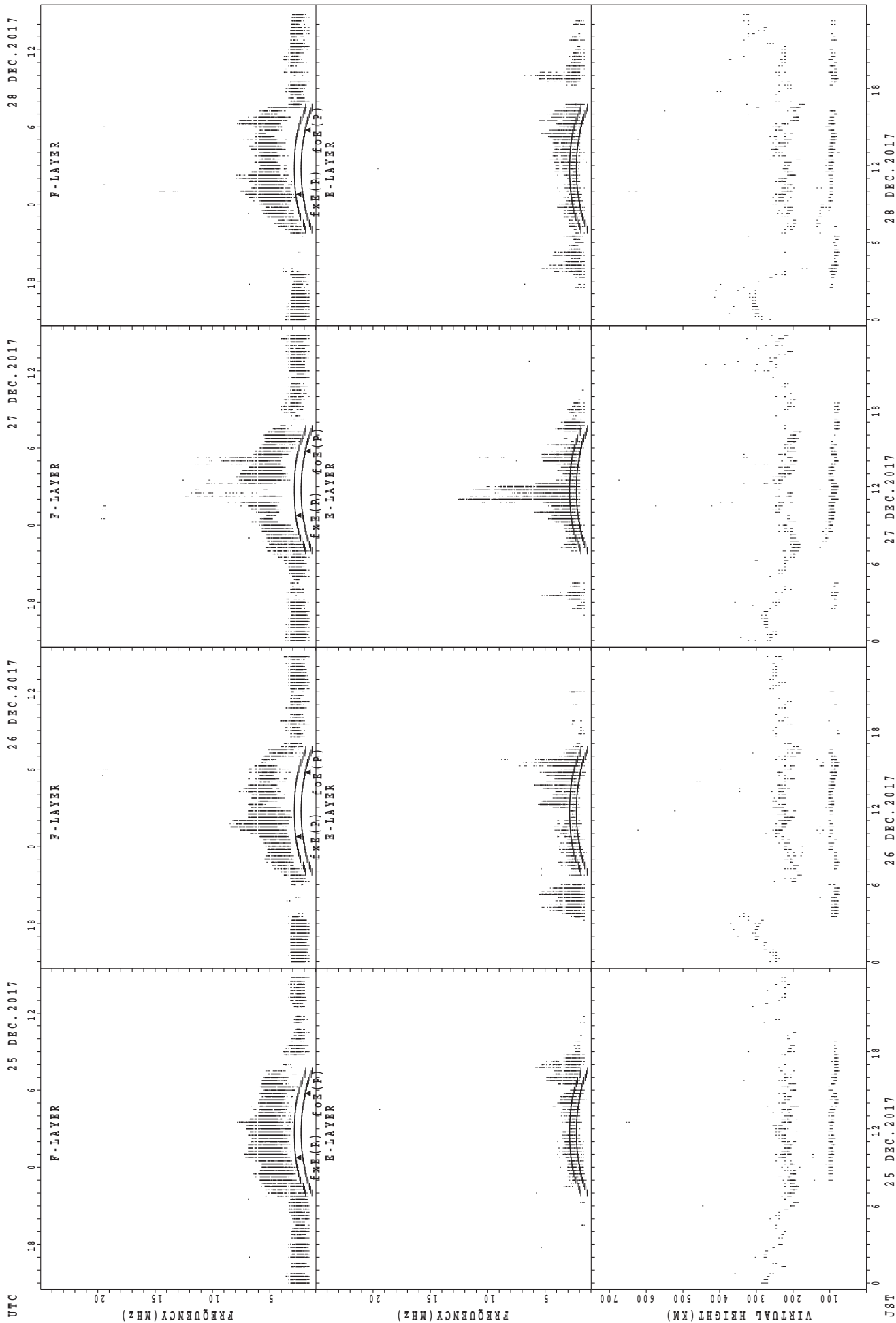
foE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Kokubunji



f_xE(P); PREDICTED VALUE FOR f_xE
foE(P); PREDICTED VALUE FOR foE

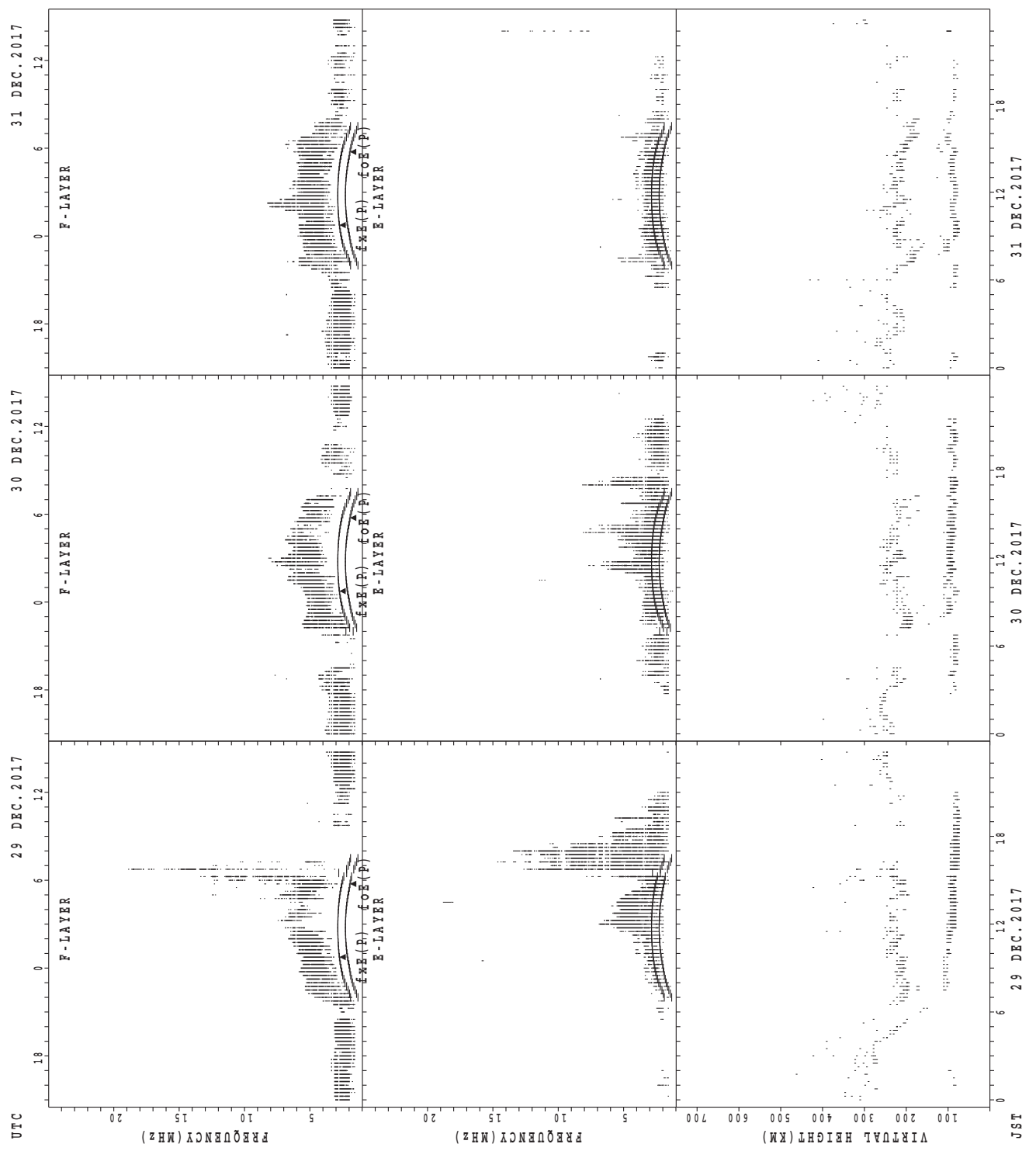
SUMMARY PLOTS AT Kokubunji



foE(P); PREDICTED VALUE FOR foE
foE(O); OBSERVED VALUE FOR foE

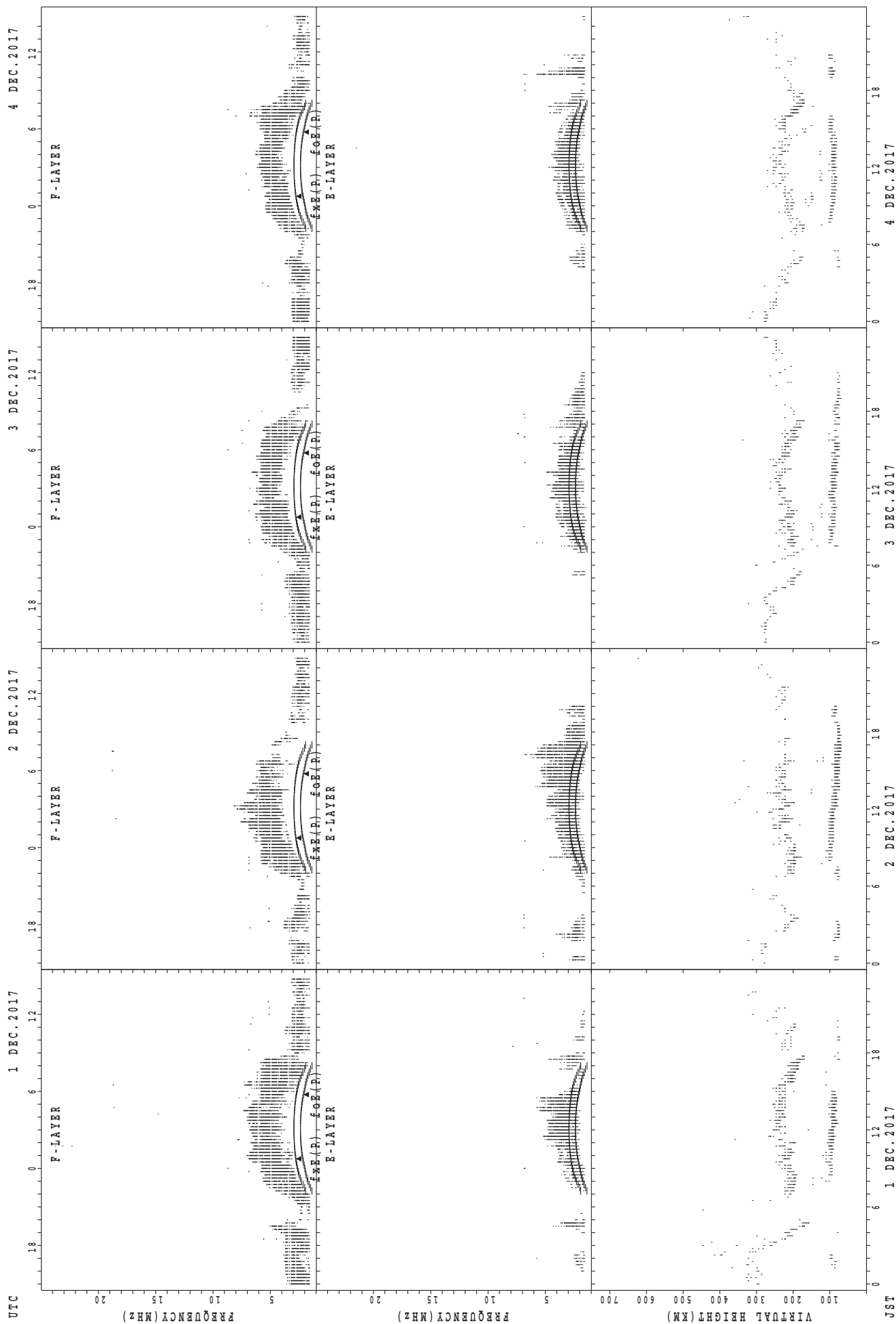
JST

SUMMARY PLOTS AT Kokubunji



f_xE(P); PREDICTED VALUE FOR f_xE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

4 DEC.2017

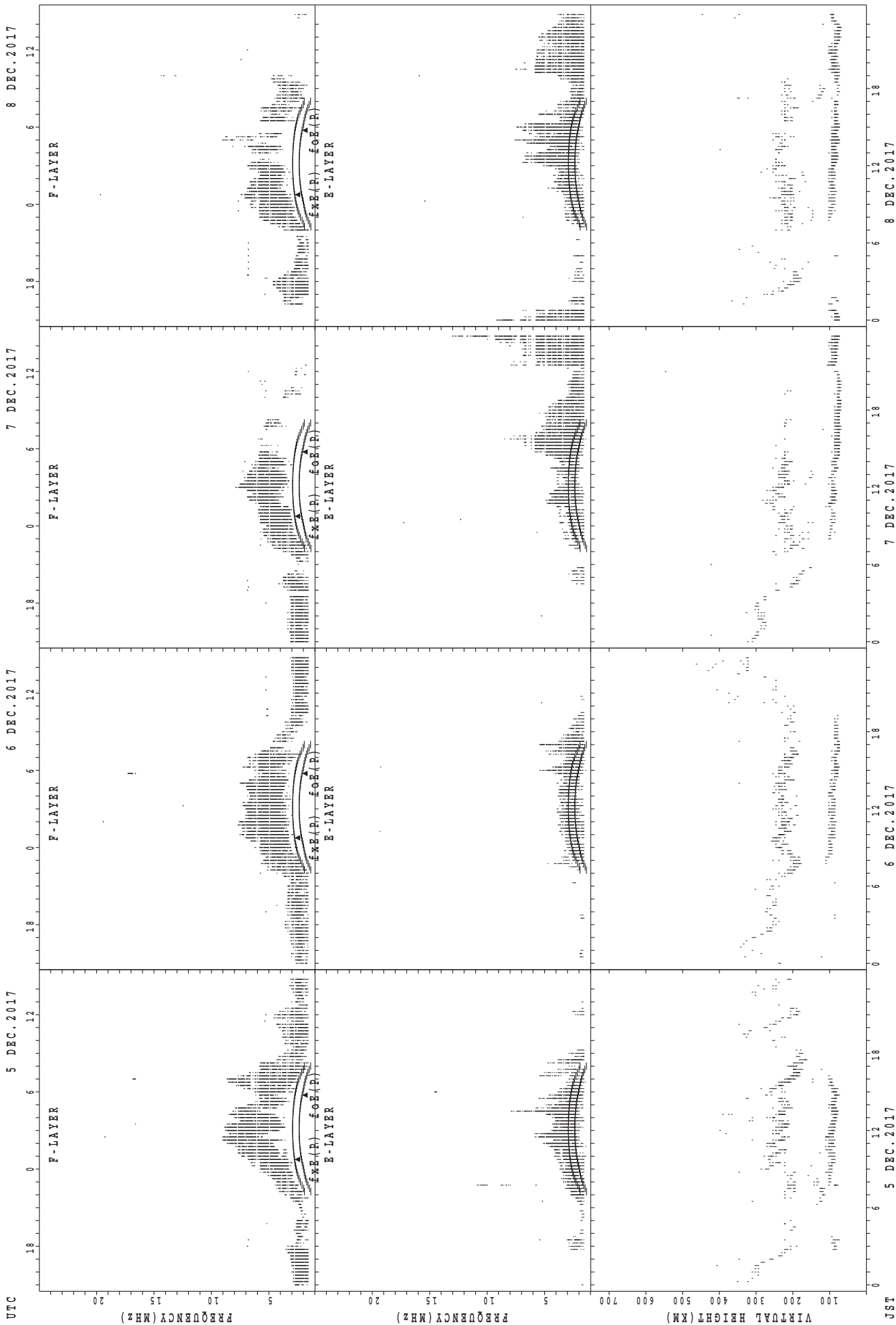
3 DEC.2017

2 DEC.2017

1 DEC.2017

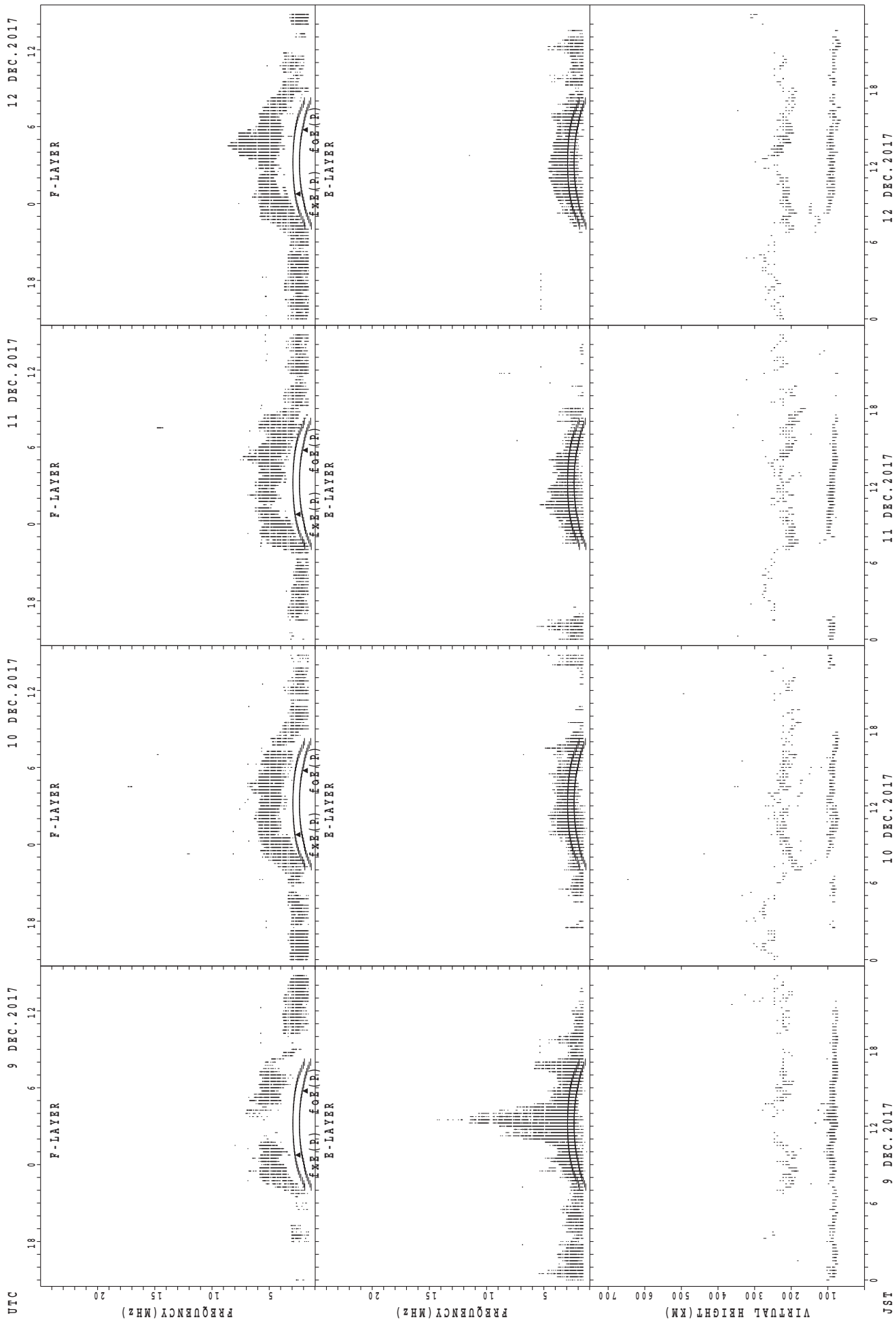
JST

SUMMARY PLOTS AT Yamagawa



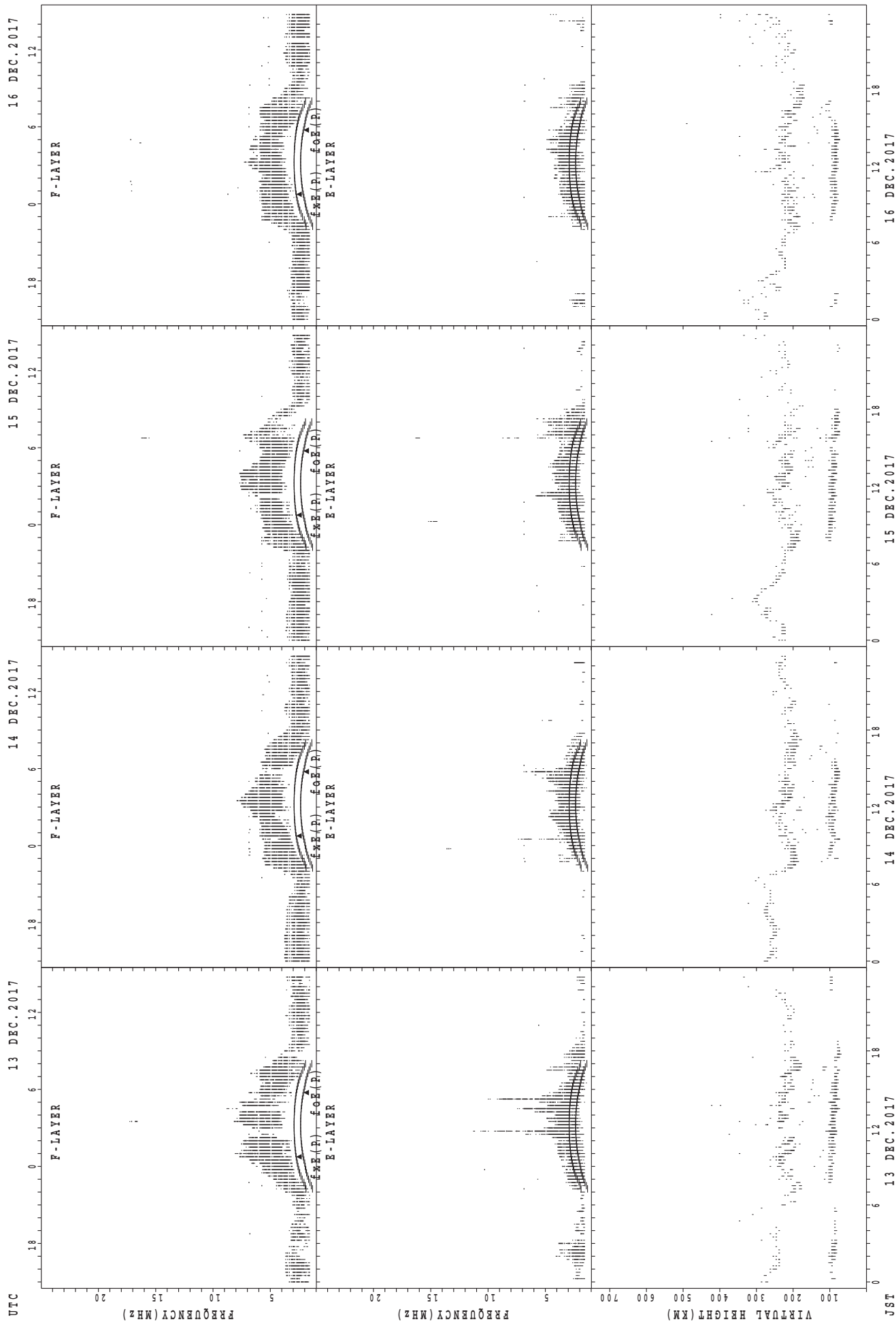
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



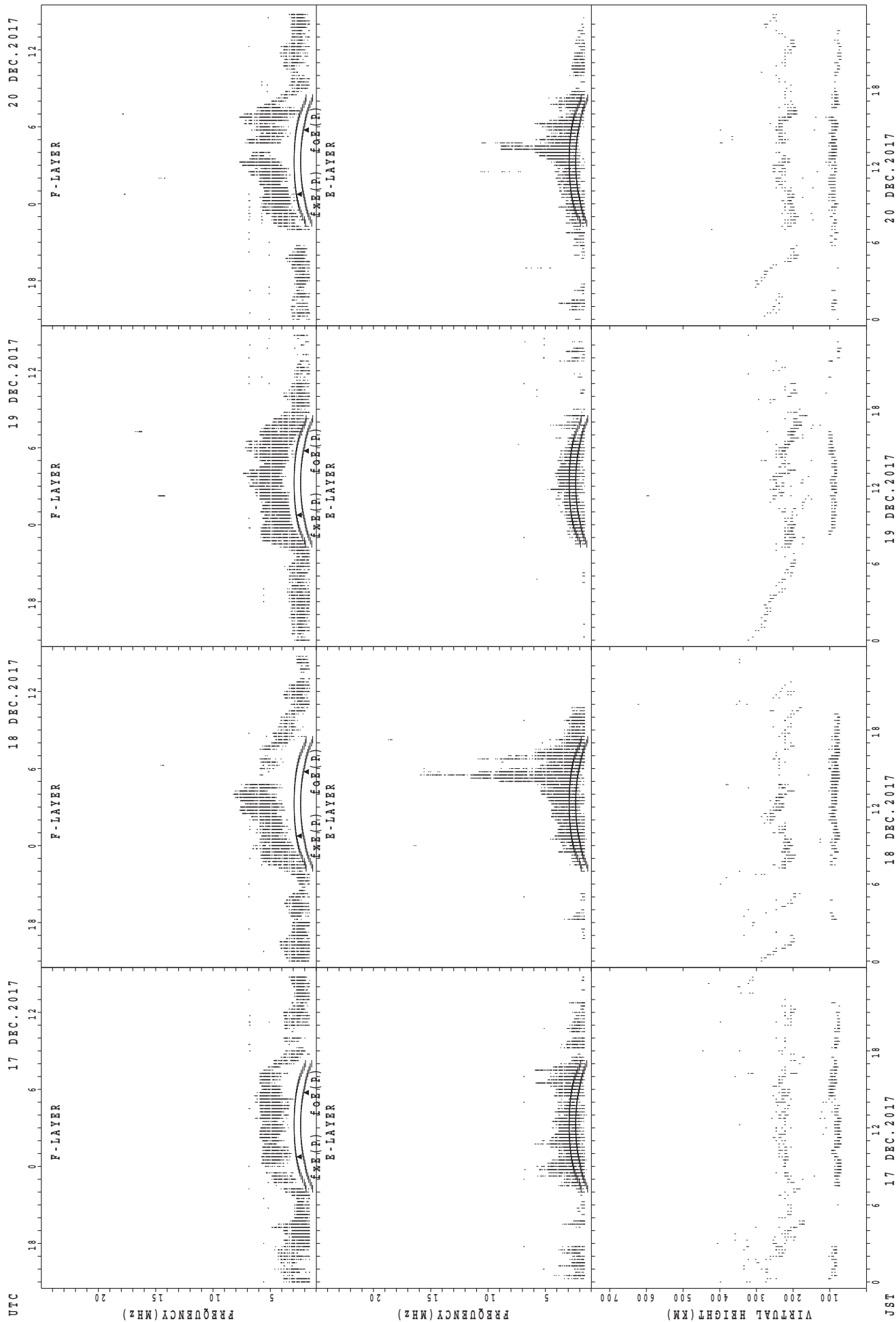
fxe(p); PREDICTED VALUE FOR fxe
foe(p); PREDICTED VALUE FOR foe

SUMMARY PLOTS AT Yamagawa



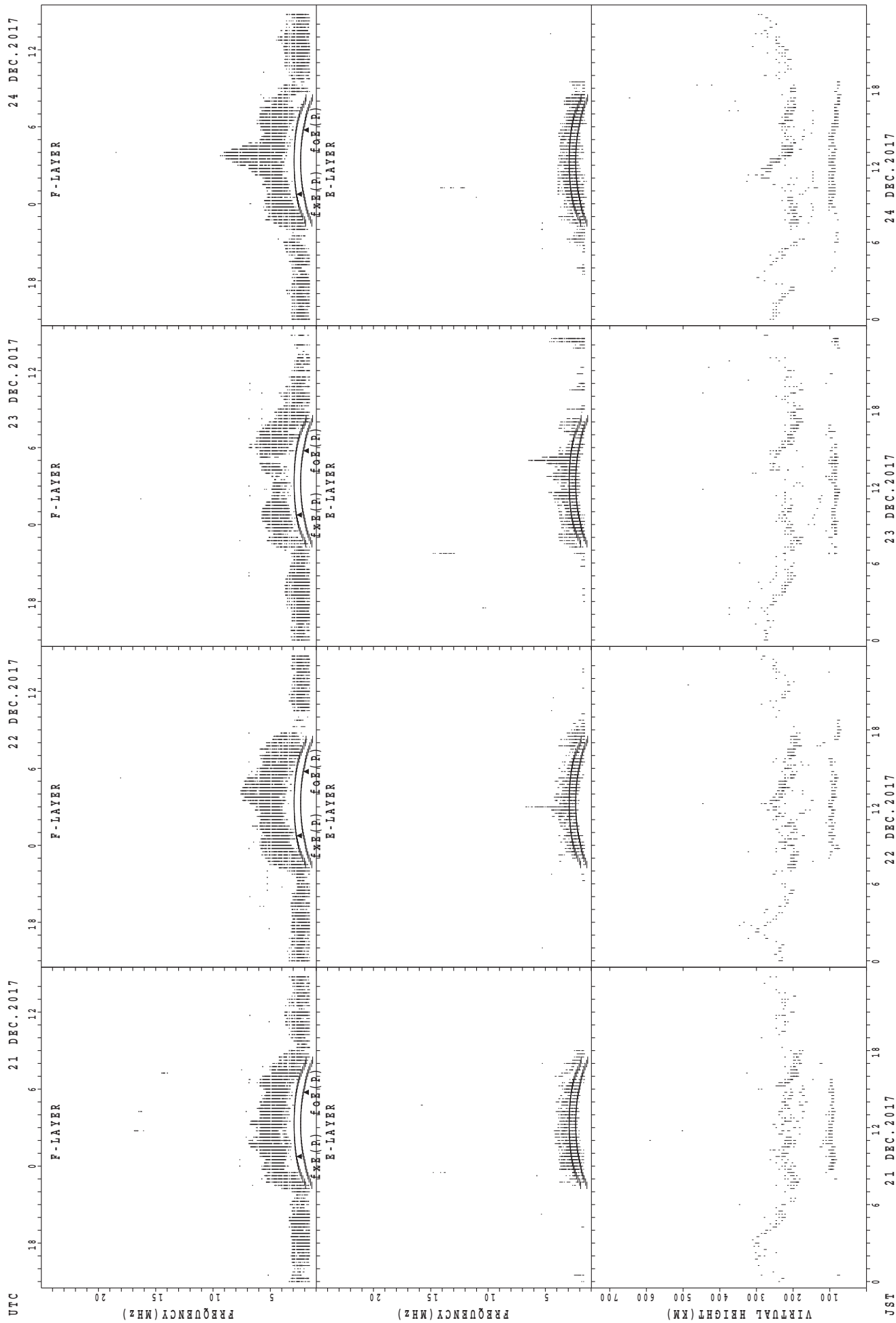
f_xE(P); PREDICTED VALUE FOR f_xE
f_oE(P); PREDICTED VALUE FOR f_oE

SUMMARY PLOTS AT Yamagawa



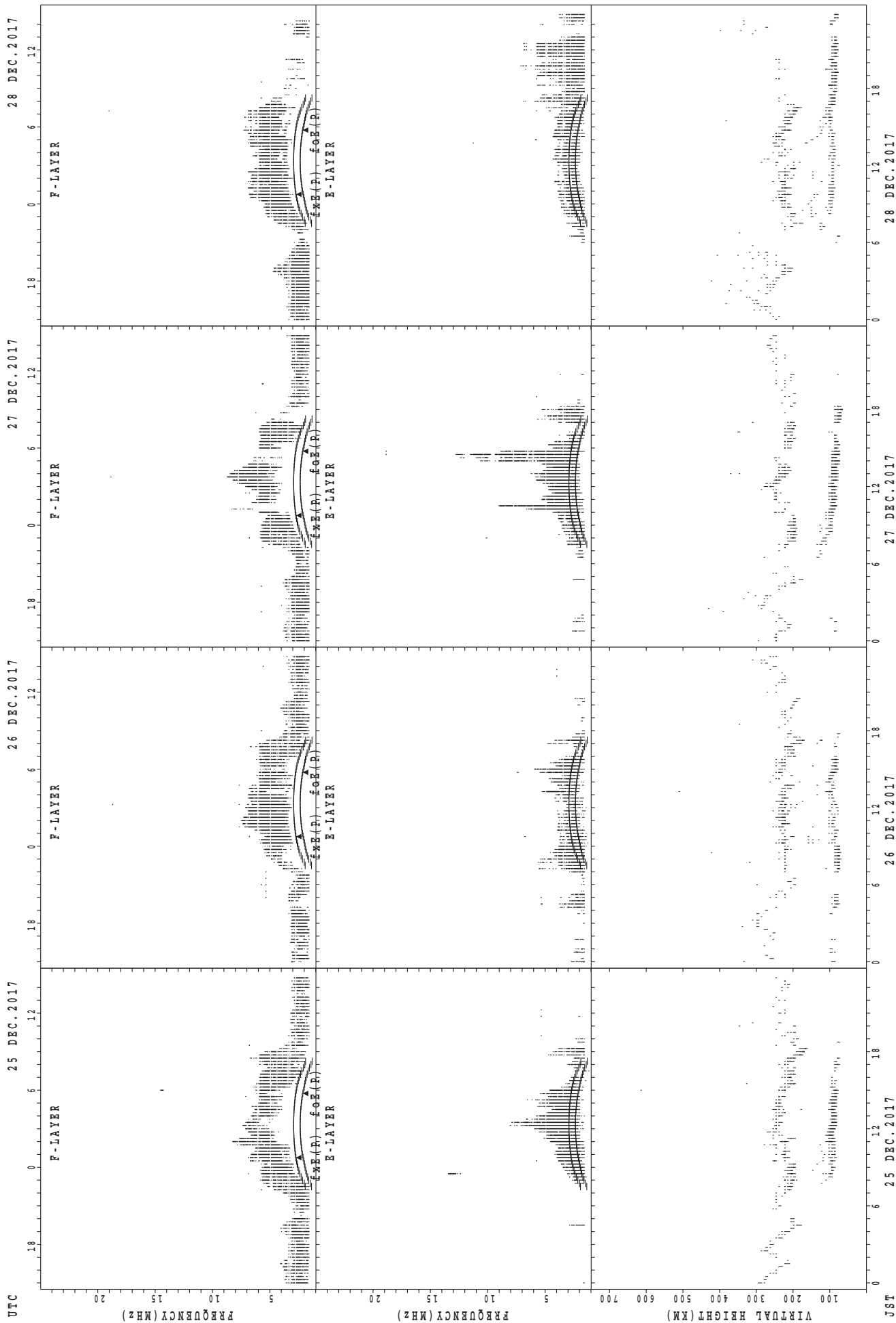
$f_xE(P)$; PREDICTED VALUE FOR f_xE
 $foE(P)$; PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



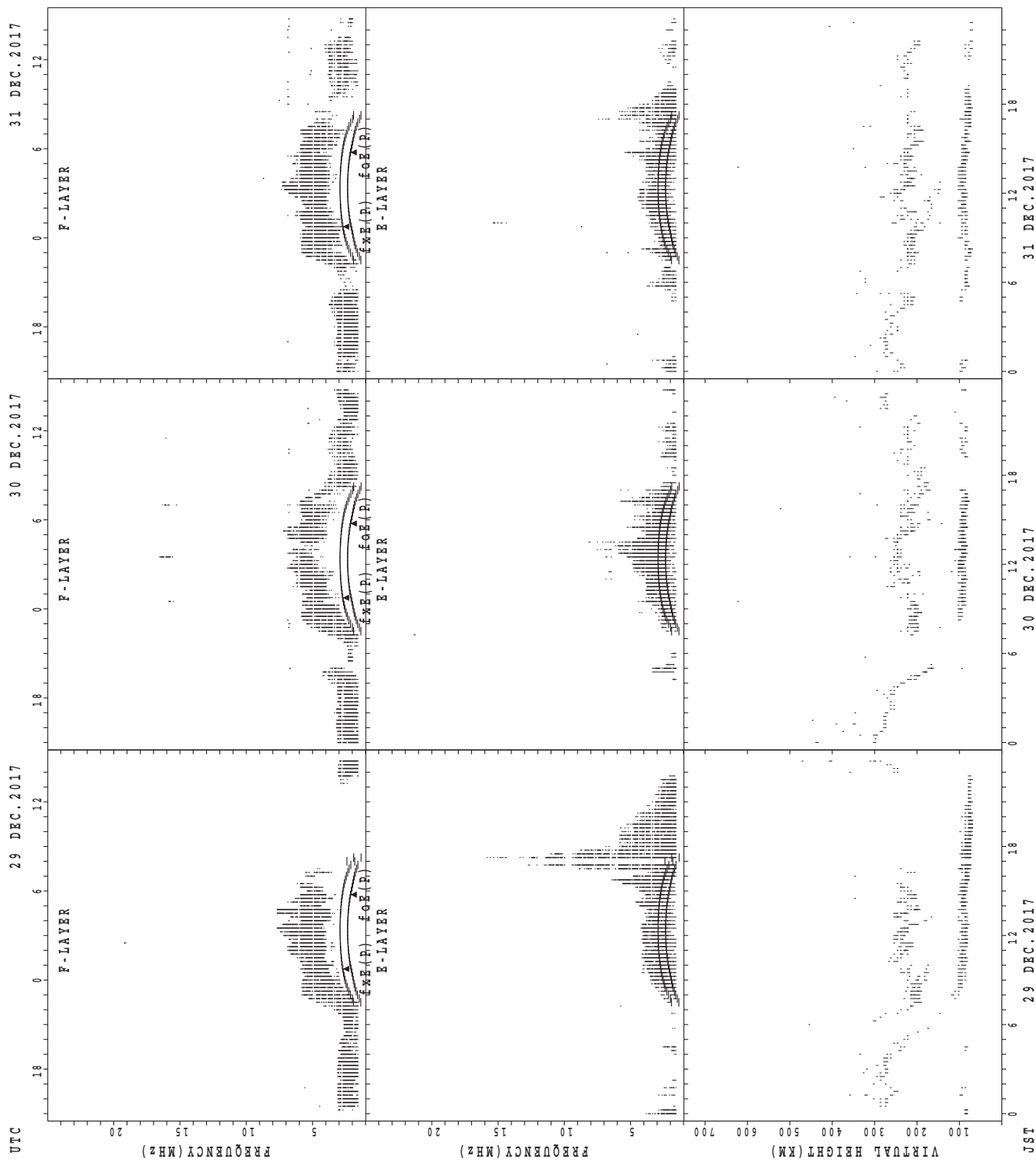
fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Yamagawa



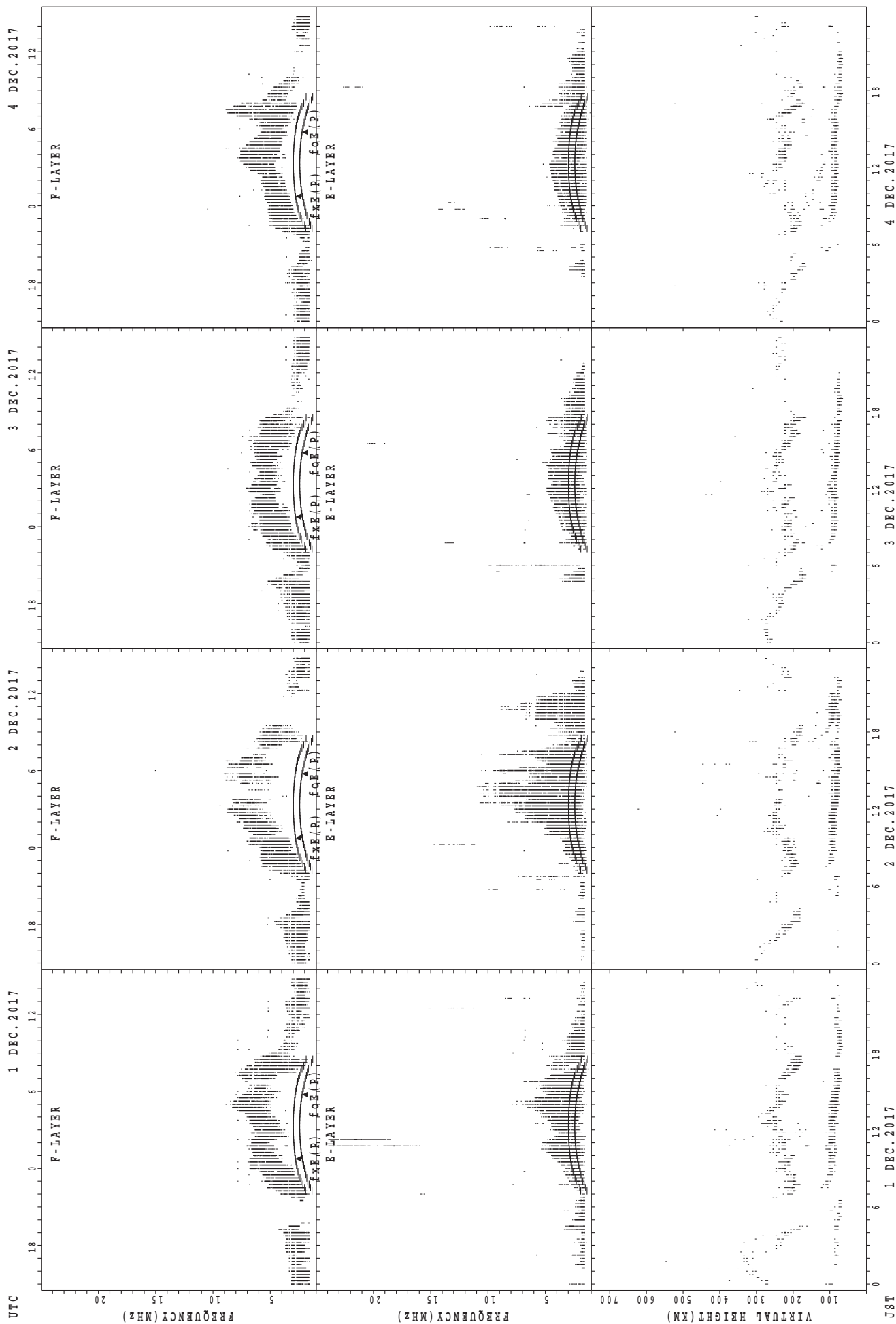
fxe(p); PREDICTED VALUE FOR fxe
foe(p); PREDICTED VALUE FOR foe

SUMMARY PLOTS AT Yamagawa



f_xe(P); PREDICTED VALUE FOR f_xe
foe(P); PREDICTED VALUE FOR foe

SUMMARY PLOTS AT Okinawa



fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

4 DEC.2017

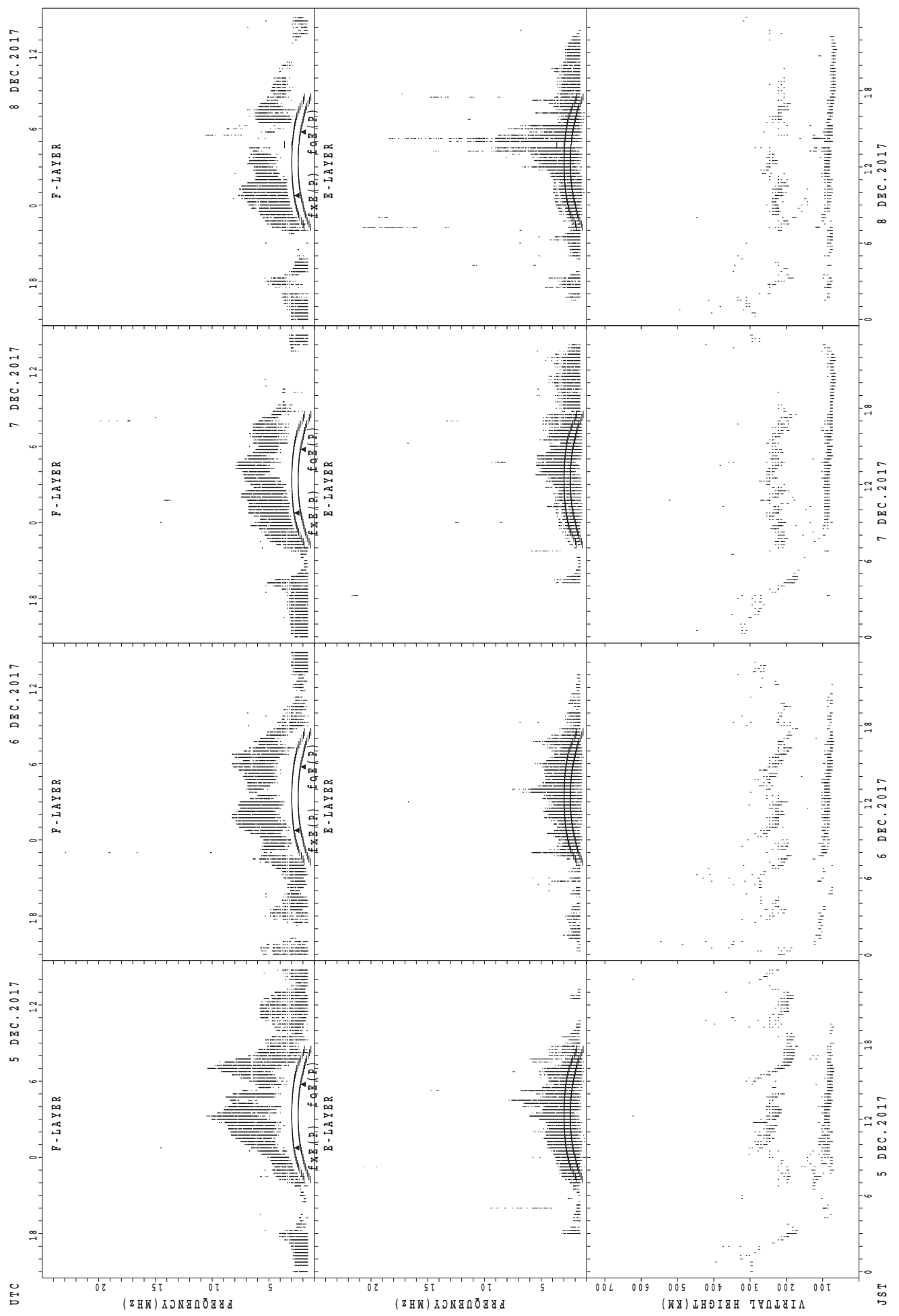
3 DEC.2017

2 DEC.2017

1 DEC.2017

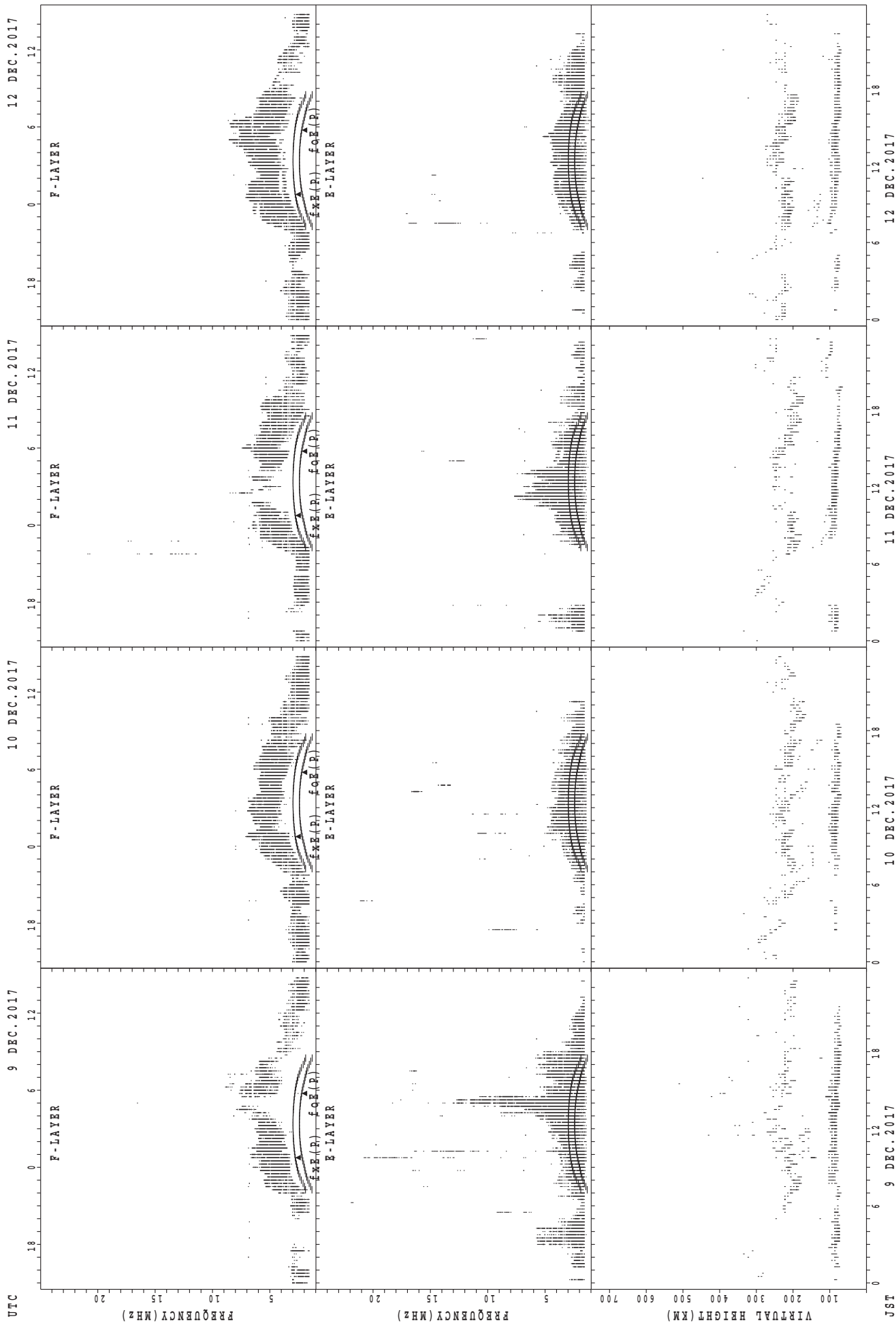
JST

SUMMARY PLOTS AT Okinawa



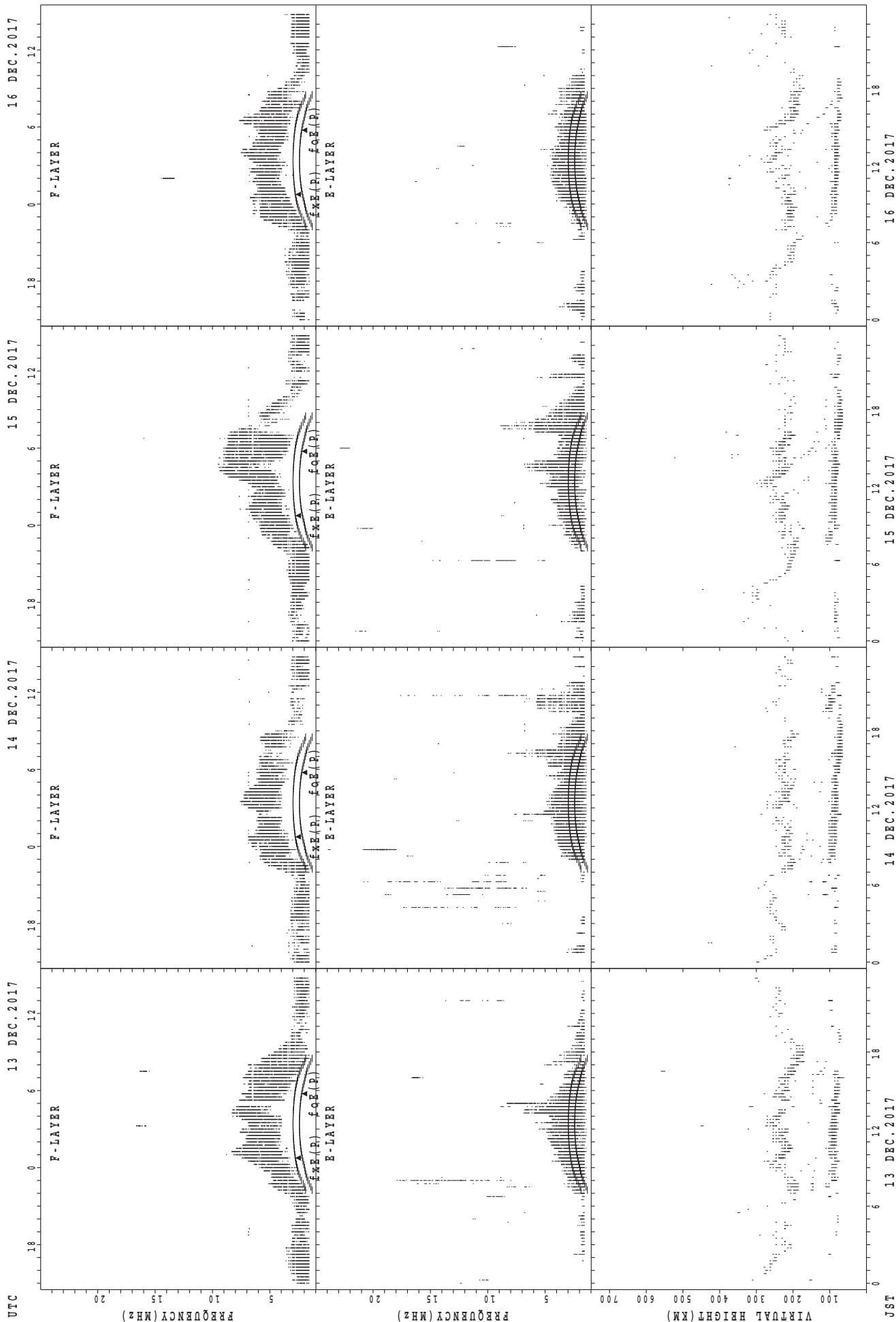
fxe(P); PREDICTED VALUE FOR fxe
 foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



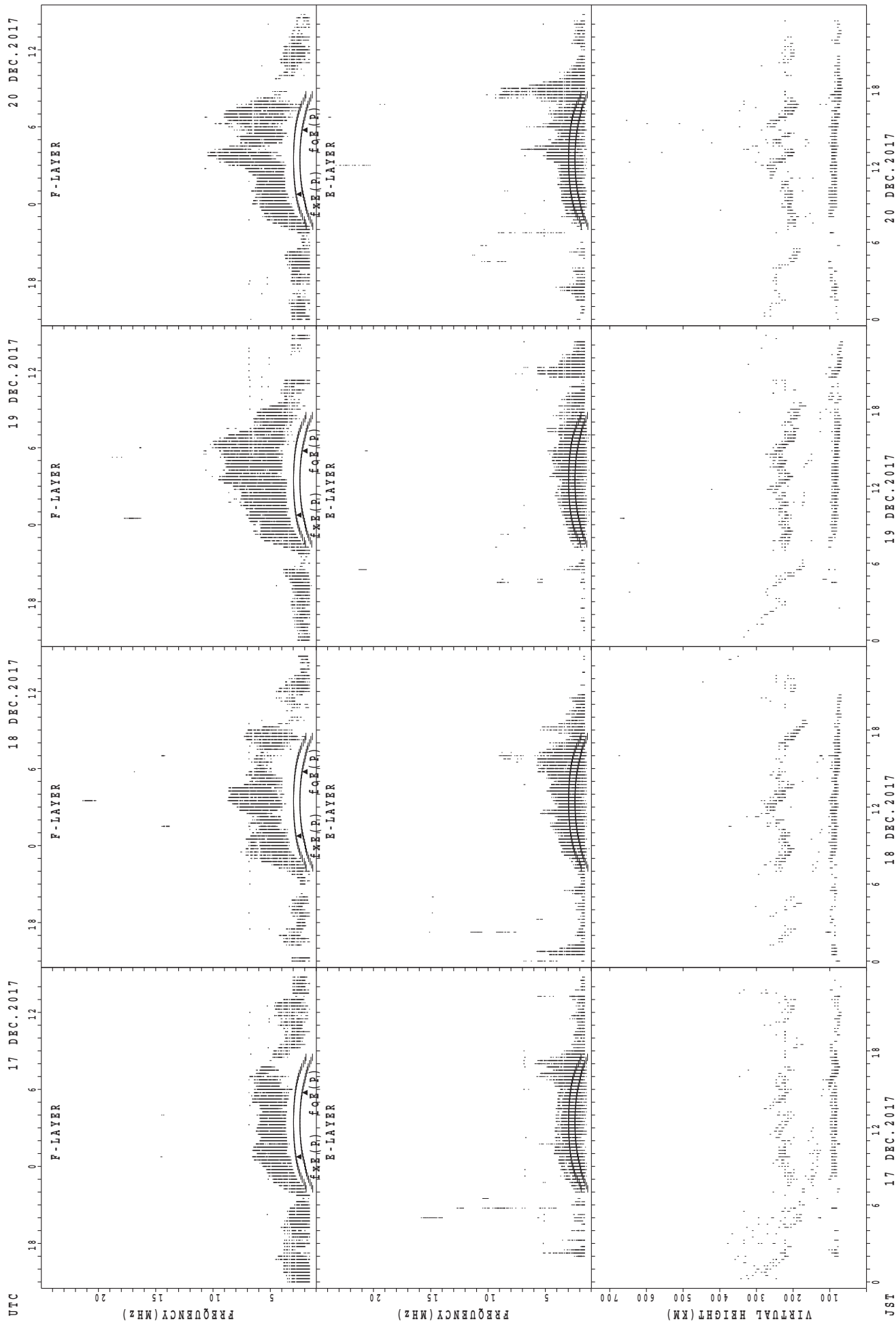
foE(P); PREDICTED VALUE FOR foE
foF(P); PREDICTED VALUE FOR foF

SUMMARY PLOTS AT Okinawa



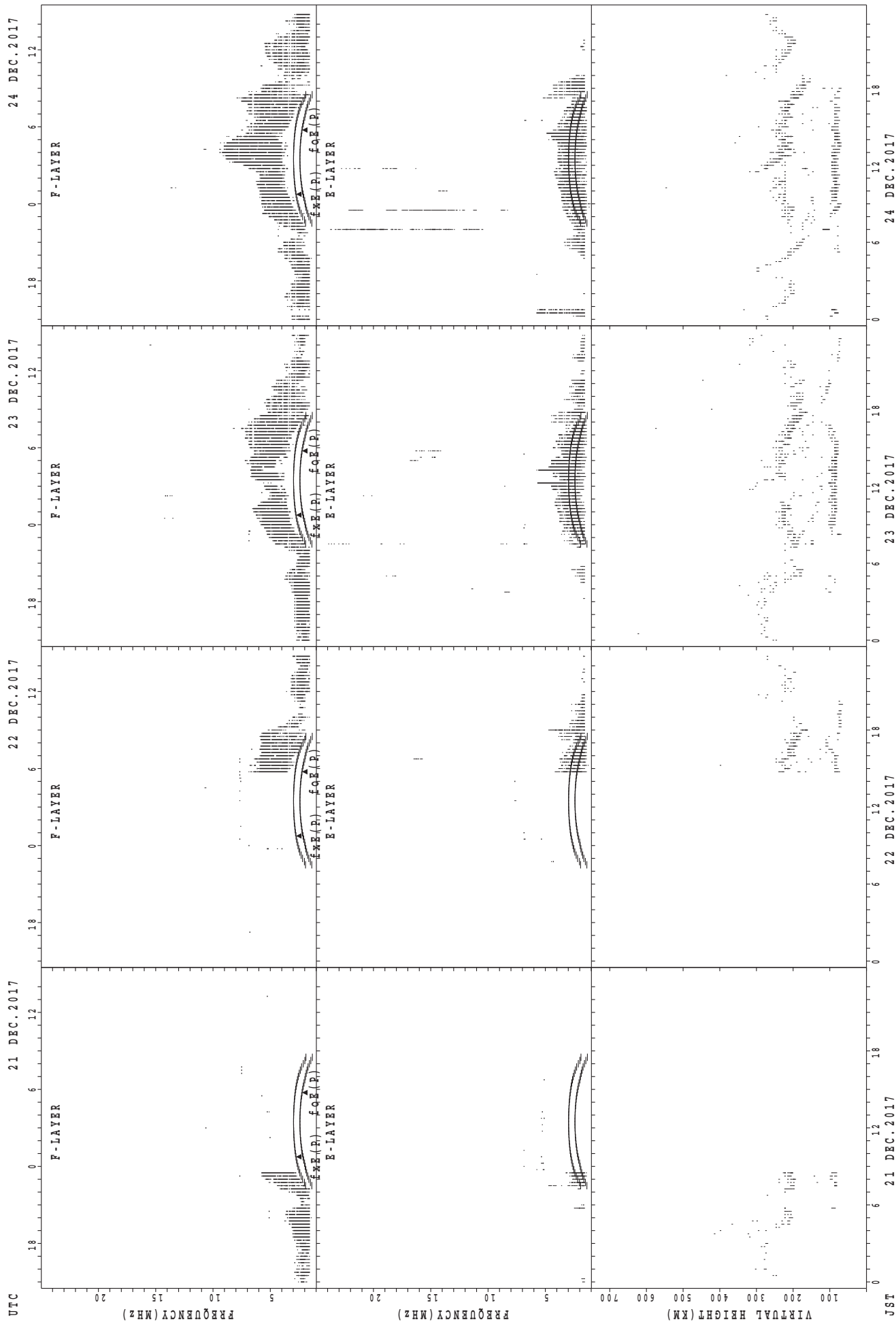
fxE(P); PREDICTED VALUE FOR fxE
foE(P); PREDICTED VALUE FOR foE
fxE(O); OBSERVED VALUE FOR fxE
foE(O); OBSERVED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



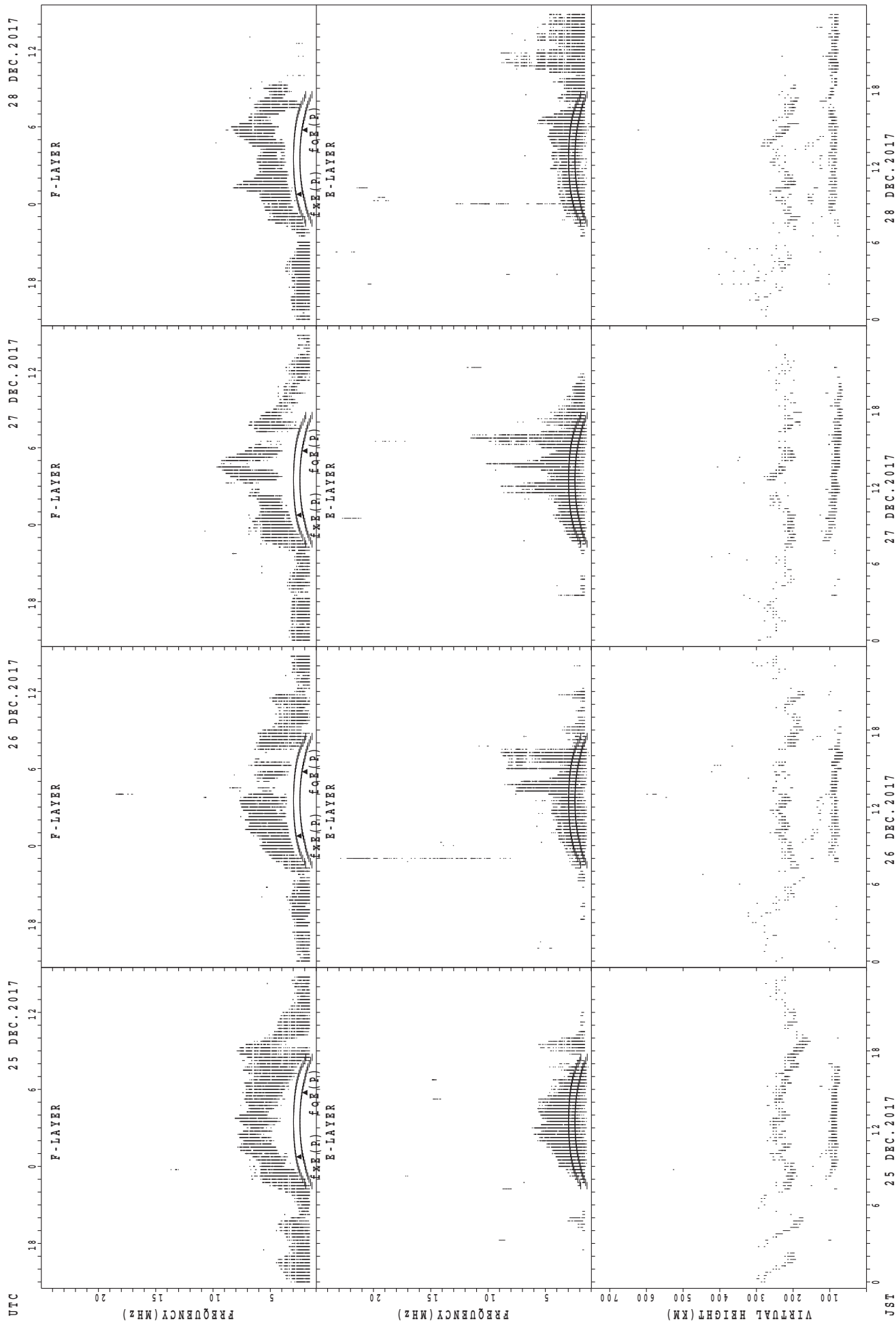
fxE(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



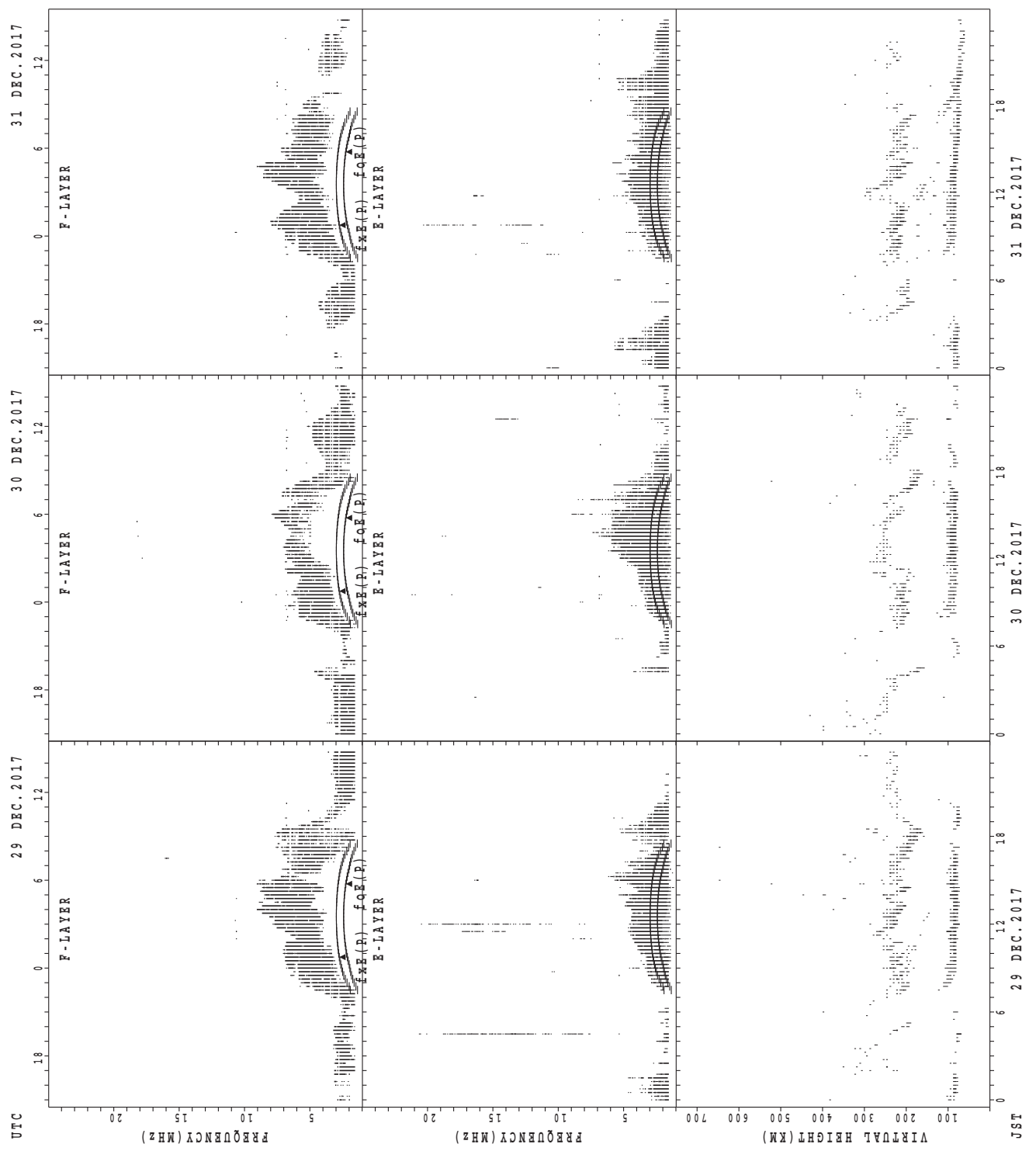
fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



fxe(P); PREDICTED VALUE FOR fxe
foE(P); PREDICTED VALUE FOR foE

SUMMARY PLOTS AT Okinawa



foE(P); PREDICTED VALUE FOR foE
foF(P); PREDICTED VALUE FOR foF

MONTHLY MEDIANS OF h'F AND h'Es
 DEC. 2017 135E MEAN TIME (UTC+9H) AUTOMATIC SCALING

h'F STATION Wakkanai LAT. 45°10.0'N LON. 141°45.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT						1			3	3	9	17	16	11	10	2	2							
MED						326			232	212	224	220	217	214	222	201	191							
U Q						163			234	226	242	232	234	230	234	202	192							
L Q						163			210	208	212	212	212	212	208	200	190							

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	11	8	6	9	9	7	5	16	22	30	27	30	29	28	29	26	25	21	21	19	21	19	14	11
MED	81	83	89	89	89	97	95	112	141	104	107	98	99	95	97	103	99	95	93	87	89	89	89	89
U Q	91	88	89	93	95	139	133	158	167	131	143	113	130	112	130	123	173	105	111	97	103	97	91	117
L Q	79	82	85	81	86	89	88	90	113	93	91	91	88	89	93	87	88	84	89	81	80	83	81	87

h'F STATION Kokubunji LAT. 35°43.0'N LON. 139°29.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT											4	12	14	9	18	11	3	1						
MED											253	229	228	240	216	216	258	208						
U Q											261	247	250	253	226	226	262	104						
L Q											237	222	216	224	212	194	218	104						

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	4	4	4	2	10	9	8	16	28	29	30	29	29	28	29	29	22	20	12	11	13	13	7	7
MED	93	88	90	91	91	89	89	136	107	105	100	95	95	95	91	93	90	87	86	89	89	95	89	91
U Q	97	89	93	95	93	128	98	169	135	143	119	109	98	100	98	103	137	97	92	99	92	102	95	97
L Q	85	85	87	87	89	81	83	110	99	97	95	91	89	88	85	89	87	83	81	83	82	84	89	89

h'F STATION Yamagawa LAT. 31°12.0'N LON. 130°37.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	1	9	5			16	5	7	1						
MED									228	242	230	240			240	240	216	204						
U Q									114	121	251	265			247	262	242	102						
L Q									114	121	221	223			227	228	208	102						

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	7	5	6	4	4	7	5	10	30	31	31	31	30	31	31	31	29	25	23	14	10	9	6	6
MED	89	93	90	92	89	89	87	105	111	101	107	97	95	91	91	87	89	83	85	83	85	83	85	91
U Q	95	96	95	139	133	167	92	129	155	139	131	119	101	105	95	101	106	94	175	87	91	87	89	99
L Q	83	89	81	88	89	85	86	83	99	95	95	93	91	89	87	83	83	81	79	79	81	81	81	81

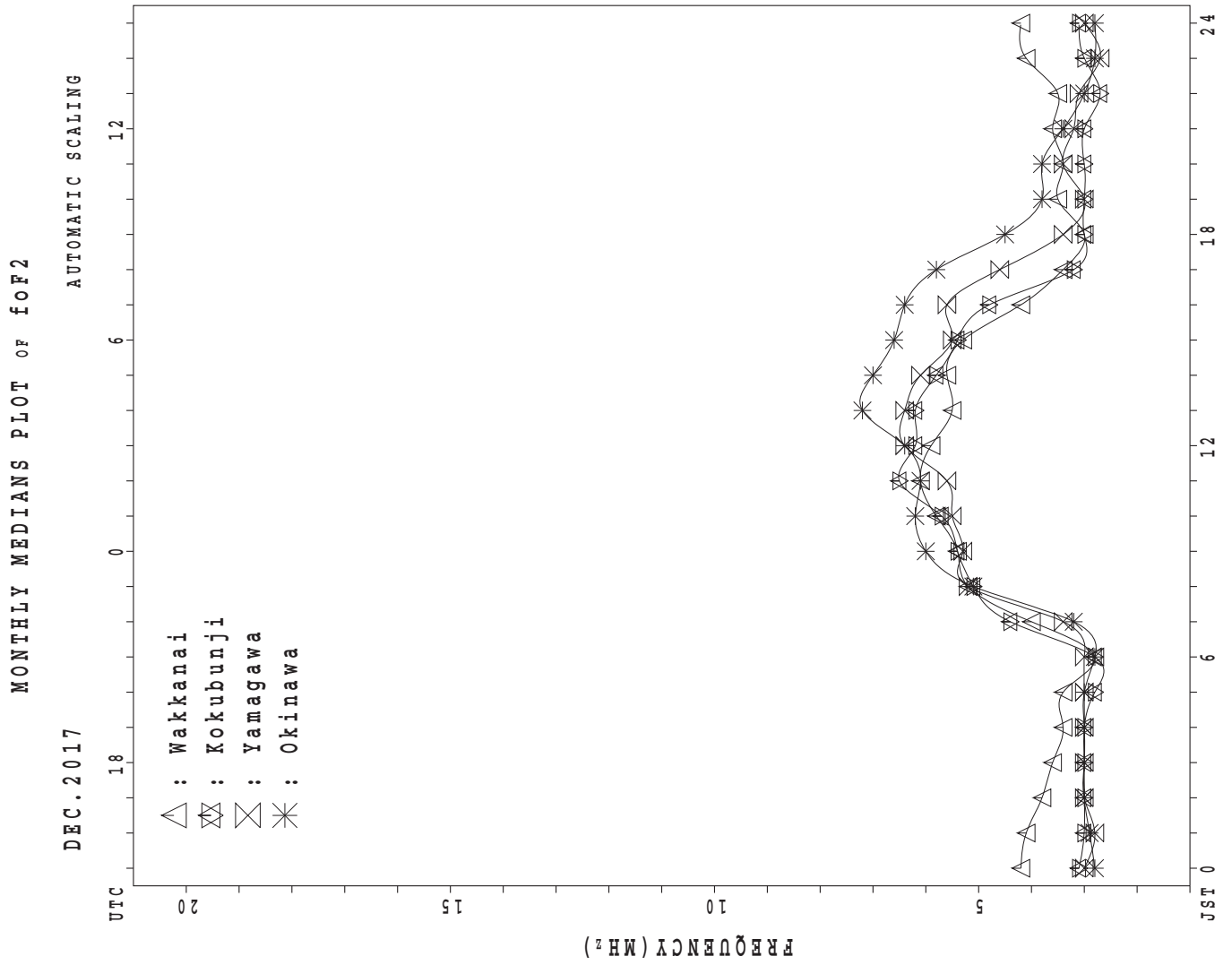
MONTHLY MEDIANS OF h'F AND h'Es
 DEC. 2017 135E MEAN TIME (UTC+9H) AUTOMATIC SCALING

h'F STATION Okinawa LAT. 26°41.0'N LON. 128°09.0'E

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1	9	19					18	14	8	3					
MED									252	226	232					226	226	203	208					
U Q									126	239	244					242	234	211	208					
L Q									126	224	222					218	208	200	200					

h'Es

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	5	7	9	8	7	9	7	9	30	29	29	29	29	29	29	30	30	30	28	29	20	13	12	8
MED	97	85	87	86	87	97	89	109	108	113	119	95	99	95	89	89	83	87	83	81	81	77	77	82
U Q	114	89	89	96	91	153	91	163	131	148	140	107	119	110	104	113	95	119	101	110	83	90	90	95
L Q	82	83	85	83	83	81	83	83	101	94	96	89	93	88	85	83	79	83	77	75	78	74	73	75



IONOSPHERIC DATA STATION Wakkanai

DEC.2017 f_{XI} (0.1MHz)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1		57	58	58	58	58		32											X		X	43	47	59	59		
2		59	59	X	X	37	43	55	58										X	X	37	39	44	44	43	46	
3		47	47	48	59	X	X	38	36	35									X	X	33	32	39	56	56	56	
4		57	58	58	56	47	44	46	45										X	X	35	37	37	41	53	58	
5		59	47	47		X	X	33	28	35									X	X	59	63	67	65	64	88	
6		90	58	58	59	60	56	55	58		70	70	88					X	X	44	40	41	37	40	47	57	
7		48	X	X	X	39	41												X	X	39	53	A	38	58	58	
8		58	59	59	56	X	X	37	32	31								X	X	34	38	40	44	56	56	41	56
9		56	58	58	58	53	36												A	A		39	37	33	57	55	
10		56	58	X	X	X	35	34											A	A		33	36	36	35	39	
11		X	X	X	X	X	X												X	X	33	39	46	44	44	44	
12		X	X	X	X	X	X												X	X	35	35	39	27	33	38	
13		X	X	X	X	X	X												X	X	39	54	57	57	57	57	
14		57	57	57	58	48	X	31	32										X	X	38	48	56	48	58	56	
15		57	58	58	58		61	44	54										X	X	36	33	38	58	41	46	58
16		58				58	51												X	X	39	41	39	43	39	58	
17		57	57	57	57	57	48	34											X	X	31	34	38	36	36	41	
18		X	X	X	X	X	X											X	X	51	33	37	43	33	38	35	
19		X	X	X		X	X												X	X	33	31	30	34	57	57	
20		58	56	56	57	55	46	39	56										X	X	31	43	42	56	58	58	
21		58	56	48	40	34	29											X	A	41	31	35	33	33	35	34	
22		X	X	X	X	X	X												X	X	30	30	31	34	31	35	
23		X	X	X		X	X												X	X	31	29	A	X	X	X	
24		X	X	X	X	X	X												X	X	31	36	37	38	38	39	
25		X	X	X	X	X	X												X	X	32	32	35	32	41	54	
26		56	39	X	X	39	50	39											X	X	33	32	38	39	42	47	
27		55	52	46	39	49	48	35										X	X	56	36	39	39	51	58	57	
28		52	57	56	45	49	47												X	X	38	44	44	45	46	56	
29		58	58	58	X	X	X												X	X	29	37	34	34	37	46	
30		X	56	X	X	X	X												A	A		40	35	43	54	49	
31		57	57	57	57	48	58	50	53										A	A		36	38	36	38	51	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT		31	30	30	28	29	30	15	6		1	1	1					4	3	27	30	29	31	31	31		
MED		56	56	46	43	40	X	36	35	55		70	70	88				X	X	46	38	33	38	39	40	44	55
U Q		58	58	57	57	51	46	46	58									X	X	54	44	38	41	44	47	57	57
L Q		X	X	X	X	X	X											X	X	X	X	X	X	X	X	X	X
		39	39	40	39	37	33	33	53									38	36	31	34	36	34	38	41		

DEC.2017 f_{XI} (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC. 2017 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F 37	F 43	F 41	F 36	F 34	F 36	F 20	F 37	50	53	67	68	68	58	60	50	R 47	40	26	35	36	F 33	F 31	F 46
2	F 32	F 33	F 31	F 30	F 27	F 30	F 37	F 46	56	59	67	67	60	60	57	48	37	29	30	32	F 29	F 31	F 27	F 30
3	F 33	F 34	F 32	F 31	F 31	F 29	F 22	F 40	45	47	56	57	58	50	52	44	34	26	26	25	F 30	F 32	F 36	F 31
4	F 42	F 38	F 38	F 31	F 28	F 23	F 30	F 38	52	50	53	56	53	53	46	53	38	25	28	31	F 26	F 34	F 35	F 31
5	F 41	F 36	F 33		F 26	F 21	F 23	F 38	72	56	77	V 68	V 70	58	62	64	53	46	52	56	60	58	57	F 52
6	F 44	F 43	F 42	F 38	F 38	F 27	F 34	F 43	52	58	F 58	F 74	F 73	61	62	53	42	37	33	34	30	33	F 36	F 32
7	F 35	F 30	F 32	F 32	F 27	F 31	F 25	F 38	50	52	60	68	60	52	56	48	38	46	32	33	F A	F 25	F 35	F 42
8	F 37	F 38	F 30	F 26	F 30	F 25	F 19	F 38	51	58	V 64	V 64	54	52	58	52	27	31	33	31	F 39	F 38	F 34	F 40
9	F 43	F 32	F 37	F 32	F 29	F 29	F 43	F 38	47	47	58	60	60	50	48	48	33	28	F A	32	30	26	F 31	F 31
10	F 34	F 34	F 34	F 32	F 30	F 24	F 21	F 38	52	46	55	57	58	52	50	49	38	27	F A	26	29	29	28	32
11	F 32	F 38	F 33	F 30	F 29	F 27	F 26	F 38	46	50	54	48	62	60	45	48	41	31	26	32	39	F 37	F 37	F 37
12	F 37	F 38	F 38	F 34	F 34	F 29	F 26	F 36	50	50	55	67	J 69	J 57	54	59	42	29	28	28	32	J 20	R 26	F 31
13	F 31	F 30	F 32	F 32	F 32	F 32	F 28	F 37	67	60	55	58	J 64	R 71	55	52	39	32	28	41	F 44	F 44	F 43	F 46
14	F 41	F 40	F 43	F 33	F 30	F 24	F 21	F 39	52	51	58	68	61	55	54	44	39	26	26	30	F 42	F 34	F 38	F 44
15	F 46	F 45	F 44	F 42	F 41	F 26	F 30	F 39	52	51	55	53	57	57	50	56	35	26	F 26	31	F 39	F 34	F 30	F 46
16	F 46				F 47	F 23	F 32	F 38	51	54	56	56	57	54	53	50	37	32	32	34	32	36	31	F 44
17	F 32	F 32	F 26	F 32	F 30	F 26	F 19	F 31	45	47	C 51	52	53	51	51	40	30	24	27	31	29	29	34	
18	F 32	F 32	F 34	F 30	F 30	F 29	F 23	F 37	55	58	63	69	65	55	55	57	44	26	26	30	36	26	31	F 28
19	F 28	F 32	F 33	F 33	F 31	F 29	F 30	F 43	53	51	J 51	J 62	R 52	54	59	43	33	29	26	24	23	27	F 34	F 43
20	F 42	F 28	F 31	F 42	F 36	F 31	F 21	F 32	50	58	63	50	59	70	66	46	34	26	24	30	F 29	F 32	F 40	F 43
21	F 36	F 31	F 30	F 28	F 22	F 19	F 20	F 31	43	47	51	56	55	53	54	52	34	F A	24	28	26	26	28	27
22	F 27	F 30	F 30	F 29	F 25	F 22	F 19	F 32	44	54	54	52	53	60	49	51	52	R 34	23	23	24	27	24	28
23	F 28	F 30	F 30	F 26	F 26	F 24	F 18	F 31	46	52	48	51	53	51	52	47	41	28	24	22	F A	26	28	31
24	F 30	F 30	F 32	F 30	F 26	F 26	F 24	F 32	50	52	52	55	57	50	57	48	40	30	24	29	30	31	31	F 32
25	F 31	F 32	F 31	F 32	F 27	F 27	F 24	F 32	54	60	58	65	56	56	55	51	39	33	25	25	28	25	27	F 32
26	F 34	F 32	F 34	F 32	F 32	F 32	F 22	F 32	44	53	60	62	62	54	59	49	46	31	26	25	31	32	30	F 31
27	F 32	F 30	F 30	F 32	F 28	F 30	F 24	F 38	44	57	62	56	56	62	56	50	49	33	29	32	32	F 37	F 44	F 42
28	F 33	F 36	F 27	F 29	F 26	F 30	F 18	F 28	45	59	59	55	69	58	53	53	45	38	31	37	37	38	39	F 41
29	F 31	F 31	F 26	F 26	F 26	F 26	F 31	F 34	47	47	47	61	52	60	52	54	F A	26	22	30	27	27	30	F 35
30	F 37	F 38	F 39	F 35	F 33	F 29	F 21	F 31	40	51	59	70	57	58	53	46	35	32	F A	33	F 21	F 27	F 29	F 29
31	F 32	F 32	F 34	F 34	F 30	F 42	F 28	F 34	46	53	62	60	50	52	55	47	46	25	F A	26	31	29	F 26	F 30
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	29	31	31	31	31	31	31	30	31	31	31	31	31	30	30	27	31	29	31	31	31
MED	F 34	F 32	F 32	F 32	F 30	F 27	F 24	F 37	50	52	58	60	58	55	54	50	39	30	26	30	31	31	F 31	F 32
U Q	F 41	F 38	F 37	F 34	F 32	F 30	F 30	F 38	52	58	62	67	62	60	57	53	44	33	30	33	36	34	F 36	F 43
L Q	F 32	F 31	F 30	F 30	F 27	F 24	F 21	F 32	45	50	54	55	54	52	52	48	35	26	24	26	28	27	28	31

DEC. 2017 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2017 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L			L			L							
2											L	344	L	L	320		L							
3									L			L	L	L										
4									L			L	L	L										
5								L			L	L	L	332										
6											L	L	L	L	L									
7											L	L	L				L	L						
8									L	L	L	L	L	L										
9											L		L		L									
10												L	L											
11										L	372	L	L	L										
12												L			L									
13												L	L	L	L									
14												L	L											
15														L										
16													L	L										
17											C	L		L										
18													L	L	L	L								
19									L	L	L	L		L	L	256								
20										L	L	L	L	L	L									
21										L		L	L		L									
22												L	L	L										
23										L	L	L	L	L		L								
24											360	L	L	L	L									
25									L			L		L										
26										L	L	L	L	L	L	A								
27										L	L	L	L	L										
28											L				L									
29													L				A							
30											L	L	L	L	L									
31											L	L		L			L							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1		1	2		1	1	1								
MED								228			372	352		332	320	256								
U Q																								
L Q																								

DEC.2017 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2017 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1						204	B	184	220	240	252	264	264	264	232	204	A	A							
2							B	168	208	276	260	272	276	276	240	A	A	A			160				
3							B	B	216	240	272	276	276	256	A	192	176		A						
4							B		212	260	268	276	U R	236	248	224	208	A	B						
5								176	208	208	256	244	A	256	244	212	184	A	A						
6							176	208	216	252	224	A	252	A	228	204	A								
7							B	A	U R	A									A						
8							916	208	208		244	244	256	180	224	192	164								
9					160		A	A	A	A					A	240	200	0	B						
10							A				248	272	272		240	200	A	A							
11							B	208	216	248	260	264	256	272	228	204	A	A	A						
12							B	204	204	256	256	268	260	260	236										
13							B	196	216	224	244	264	228	A	228	192	B	192							
14							B	184	184	172	240	260	260	264	236	188		B	B						
15							B	B	196	240	260	272	272	240	220	212								156	
16							B	A	220	232	252	260	244	276	188	208	B	B							
17							B	192	220	244	260	260	272	252	A	208	A	A							
18							B	B	196	240	C	244	264	248	252	180									
19							B	B	200	A	A	304	A	256	212	192									
20			192				B	A	A																
21							B	164	208	236	252	276	252	244	208		B	B							
22							B	A	220	244	232	276	268	248	228	188									
23							B	B	224	252	252	U R	284	276	244	A	A	A	A						
24					B		B	B	204	216	248	260	284	280	256	196	A	A							
25							B	B	236	256	292	268	256	228											
26							B	A	176	224	264	280	288	268	232		A	A	A						
27							B	B	204	216	248	264	264	264	236		A	A							
28							B	188	192	232	244	260	240	240	A	A		B							
29							B	B	216	216	240	252	252	252	240	184	A	A	A						
30							B	B	208	284	240	240	240	220	220										
31							B	B	192	228	264	A	264	284	A	208	168	A	A						
							B	208	220	236	264	256	248	236											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT				1	1	1	4	11	28	28	29	28	30	28	26	22	6	1		1				1	
MED				192	160	204	196	196	208	238	248	264	262	252	232	202	172	192		160				156	
U Q							566	208	216	250	260	274	272	264	240	208	188								
L Q							176	184	196	224	240	260	252	246	224	192	164								

DEC.2017 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2017 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	91	18	20	E B 16	E B 16	G E B 16	G E B 14	G	G	J A 19	J A 62	32	40	31	32	J A 39	J A 34	109	34	60	32	J A 52	27	J A 31	E B 16	
2	24	30	28	27	21	E B 16	E B 16	G	G	36	30	31	30	J A 244	G	21	30	26	26	E B 16	J A 95	28	E B 16	21		
3	E B 16	20	20	25	35	21	92	16	G	27	48	83	49	55	37	J A	G	G	29	25	E B 16	E B 16	E B 16	E B 16		
4	22	24	20	E B 16	E B 16	E B 16	E B 16	E B 16	J A 21	J A 38	31	35	41	28	25	J A 27	28	E B 15	E B 16	E B 20	E B 16	E B 16	18	E B 17		
5	19	19	91	E B 16	E B 16	23	30	163	J A 44	J A 44	37	33	27	26	J A 40	J A 35	39	J A 37	45	31	32	33	33			
6	20	22	E B 16	112	21	E B 16	20	27	23	26	27	33	45	46	J A	J A	G	G	31	33	35	35	J A 107	32	26	30
7	E B 16	E B 16	E B 17	22	E B 16	20	23	28	J A 64	J A 51	45	32	32	36	29	24	J A 23	47	59	35	J A 63	J A 63	72	34		
8	58	26	25	26	23	21	24	30	J A 22	J A 30	28	31	140	28	G	J A	G	J A 48	45	28	29	58	31	J A 49	37	
9	33	32	28	30	30	33	125	64	J A 51	J A 58	34	41	34	38	101	25	E B 16	27	67	32	J A 64	46	39	27		
10	20	E B 16	E B 16	E B 16	E B 16	J A 102	22	28	33	41	J A 95	29	42	G	J A 26	J A 40	34	28	40	J A 52	J A 52	34	34	27		
11	J A 50	22	25	J A 20	24	J A 24	18	G	28	25	30	31	55	37	J A 26	J A 50	30	35	39	33	J A 51	26	31	37		
12	32	26	28	22	E B 15	E B 16	E B 16	24	J A 61	J A 31	J A 45	J A 30	55	58	26	E B 16	E B 16	23	19	20	22	32	E B 16	25		
13	30	18	27	21	29	28	J A 56	24	21	J A 25	J A 28	35	35	26	27	G	E B 16	23	22	63	16	16	26	16		
14	J A 50	30	26	22	J A 118	J A 52	J A 30	E B 16	23	27	33	32	36	46	26	23	E B 15	E B 17	28	J A 62	23	19	24	27		
15	J A 147	31	27	27	E B 15	E B 16	E B 14	34	31	27	30	53	J A 46	33	J A 37	G	E B 16	E B 16	23	27	J A 38	J A 102	59	24		
16	J A 44				E B 16	E B 16	E B 16	22	30	32	41	55	106	34	J A 84	J A 86	50	52	25	32	J A 38	J A 64	J A 134	J A 54		
17	E B 16	31	26	26	26	26	19	19	25	29	C	31	J A 31	31	34	26	33	25	28	E B 16	24	20	25	24		
18	21	22	E B 16	20	J A 153	E B 16	21	23	J A 26	J A 35	J A 59	J A 85	58	35	24	20	E B 16	33	33	45	22	27	E B 16	J A 34		
19	32	21	25	29	30	26	21	58	J A 51	J A 31	29	30	32	29	29	24	J A 28	28	29	E B 16	28	26	34	32		
20	28	J A 51	32	J A 32	28	24	24	31	22	J A 30	J A 35	J A 79	40	32	27	G	E B 16	E B 16	E B 16	24	E B 16	E B 16	E B 16	21		
21	E B 16	E B 16	23	21	26	E B 15	E B 16	29	G	28	28	G	34	30	26	26	E B 16	J A 107	58	E B 16	J A 33	J A 26	29	23		
22	24	33	24	30	J A 33	J A 28	J A 29	E B 16	23	G	28	32	32	28	83	J A 58	J A 98	J A 71	J A 31	J A 34	J A 42	J A 64	32	J A 61		
23	J A 29	33	33	J A 25	E B 16	20	33	24	G	G	28	31	G	33	27	G	J A 22	J A 42	J A 54	J A 47	J A 33	58	32	E B 31	15	
24	E B 16	E B 15	E B 16	E B 16	E B 16	E B 16	E B 16	E B 16	21	29	33	32	63	30	26	E B 21	E B 15	24	21	20	20	16	20	E B 16	E B 16	
25	E B 16	E B 16	19	19	20	20	E B 16	30	25	26	G	J A 35	34	34	31	J A 46	33	30	41	30	31	23	J A 51	E B 16		
26	E B 16	23	E B 16	20	26	23	33	33	G	34	30	31	34	31	28	90	40	J A 128	60	35	59	59	58	J A 20		
27	24	26	J A 86	18	J A 93	E B 16	19	24	J A 27	J A 32	31	32	32	J A 47	J A 30	41	E B 16	E B 16	J A 30	J A 40	J A 51	40	34	25		
28	29	E B 16	26	31	32	30	25	25	G	27	32	J A 43	J A 45	52	28	22	30	56	40	27	32	32	23	E B 16		
29	E B 17	E B 16	29	20	25	J A 47	E B 17	20	27	J A 34	J A 49	J A 68	J A 60	J A 35	J A 40	68	94	J A 156	58	27	34	28	28	J A 38		
30	25	20	27	E B 16	26	26	J A 38	E B 17	G	28	J A 50	J A 69	J A 165	35	39	J A 33	26	J A 88	J A 88	J A 53	J A 34	J A 35	40	33		
31	29	26	J A 41	27	27	E B 16	E B 16	E B 17	34	30	30	28	28	28	J A 61	27	J A 52	J A 63	J A 66	59	J A 52	33	25	22		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	31	30	30	29	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31		
MED	24	22	26	22	25	20	21	24	23	30	32	32	35	34	28	25	30	33	33	32	34	31	31	25		
U Q	32	30	28	27	30	26	J A 29	30	J A 31	J A 35	J A 44	J A 43	J A 49	J A 46	J A 37	40	40	J A 54	J A 58	40	J A 52	J A 35	J A 39	33		
L Q	E B 17	E B 18	E B 20	E B 20	E B 16	E B 16	E B 16	G	G	27	29	31	32	30	26	G	E B 16	E B 24	E B 25	E B 20	E B 23	E B 23	E B 23	E B 17		

IONOSPHERIC DATA STATION Wakkanai

DEC.2017 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	E B	E B	16	E B	E B	G E	B	G	G	18	28	29	36	29	30	35	30	20	20	24	E B	22	16	16	E B		
2	E B	16	17	E B	16	16	E B	E B	G	G	G	27	28	29	29	28	G	20	16	16	E B	E B	E B	E B	16		
3	E B	E B	E B	E B	E B	18	16	16	E B	G	26	30	28	28	28	26	G	G	18	16	16	E B	E B	E B	E B		
4	E B	E B	E B	E B	E B	16	16	16	E B	G	20	26	29	27	26	G	25	23	20	16	E B	E B	E B	E B	E B		
5	16	16	16	E B	E B	E B	G	G	G	G	22	25	25	26	26	24	24	20	17	19	19	25	20	20	17	17	
6	E B	17	17	E B	E B	E B	G	G	G	G	20	24	24	26	25	25	G	E B	16	20	23	21	16	16	E B	E B	
7	E B	E B	E B	E B	E B	16	16	16	G	G	24	28	28	24	26	26	25	22	16	19	20	16	A 63	E B	16	18	16
8	E B	E B	E B	E B	16	16	16	16	G	G	20	23	27	28	26	24	G	G	18	22	19	16	16	E B	17	17	17
9	17	16	16	18	15	16	18	19	23	28	26	29	28	34	22	22	22	E B	16	17	A 67	19	20	16	16	16	
10	16	16	16	E B	E B	E B	E B	E B	E B	G	22	29	31	27	26	G	26	19	17	20	A 40	16	17	17	17	17	
11	19	16	16	E B	E B	E B	E B	E B	G	22	24	28	28	28	26	25	22	16	17	17	17	17	17	17	17	18	
12	18	16	16	E B	E B	E B	E B	E B	E B	24	26	27	27	35	42	23	16	16	15	16	16	16	16	16	16	16	
13	E B	E B	E B	E B	E B	E B	E B	E B	G	20	22	24	29	29	24	24	G	E B	E B	E B	E B	E B	E B	E B	E B	E B	
14	E B	E B	E B	E B	E B	E B	E B	E B	E B	22	25	28	28	32	28	25	20	G	E B	E B	E B	E B	E B	E B	E B	E B	
15	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	21	25	29	35	36	29	26	G	E B	E B	E B	E B	E B	E B	E B	E B	
16	E B	16	16	E B	E B	E B	E B	E B	G	G	20	24	30	30	28	28	25	23	20	18	17	17	17	16	17	16	
17	E B	E B	E B	E B	E B	E B	E B	E B	E B	22	25	C	30	28	27	23	G	25	16	16	17	E B	16	17	17	17	
18	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	16	30	30	47	28	25	23	19	16	16	17	17	17	17	16	17	
19	17	E B	18	16	16	16	16	16	23	16	27	25	28	31	27	25	G	G	G	18	16	16	E B	E B	E B	E B	
20	E B	16	16	17	16	16	16	16	E B	21	26	26	28	29	31	25	G	E B	E B	E B	E B	E B	E B	E B	E B	16	
21	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	G	24	28	G	30	30	25	21	E B	A 107	17	16	17	17	17	E B	
22	E B	E B	16	16	16	17	17	17	16	22	G	27	27	30	26	26	22	22	20	17	16	19	17	17	16	E B	
23	16	16	16	16	16	15	16	16	16	G	G	26	29	G	29	25	G	19	22	18	16	16	A 58	18	16	15	
24	E B	E B	E B	E B	E B	E B	E B	E B	E B	20	28	30	30	28	28	26	21	E B	E B	E B	E B	E B	E B	E B	E B	E B	
25	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	G	G	28	30	30	26	28	16	16	16	16	16	16	16	16	E B	
26	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	26	28	31	29	28	24	24	22	E B	E B	16	16	16	E B	17	17	
27	E B	E B	E B	E B	E B	E B	E B	E B	E B	24	29	28	29	29	30	28	23	E B	E B	E B	16	17	17	17	17	17	
28	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	25	29	27	29	28	26	20	20	19	E B	E B	15	15	16	16	16	
29	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	20	30	30	34	28	29	35	38	A 94	A 17	E B	E B	E B	E B	E B	16	
30	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	27	29	30	28	27	26	22	17	E B	A 88	A 17	16	16	16	16	16	
31	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	17	27	27	28	28	28	34	24	28	17	A 66	17	19	19	17	17	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT		31	30	30	29	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	
MED		E B	E B	E B	E B	E B	E B	E B	E B	G	22	26	28	28	28	28	25	20	16	17	16	16	16	16	16	E B	
U Q		17	16	16	16	16	16	16	17	22	28	29	30	29	29	26	23	G	19	19	17	19	17	17	17	17	
L Q		E B	E B	E B	E B	E B	E B	E B	E B	G	G	25	26	27	28	26	24	G	E B	E B	E B	E B	E B	E B	E B	E B	

IONOSPHERIC DATA STATION Wakkanai

DEC.2017 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	17	16	16	16	16	15	14	15	16	16	17	16	21	22	16	16	17	16	16	16	16	16	16	16
2	16	16	16	16	16	16	16	10	16	18	18	17	18	23	17	16	14	16	16	16	16	16	16	15
3	16	16	16	16	16	16	16	16	16	15	15	16	16	15	18	16	16	16	16	16	16	16	16	16
4	16	17	16	16	16	16	16	16	15	11	13	15	12	13	11	11	15	15	16	16	16	16	15	17
5	16	16	16		16	16	16	15	13	11	10	10	9	11	12	10	16	16	16	16	16	16	16	16
6	16	16	16	17	16	16	16	15	16	13	14	12	15	16	16	16	16	16	14	16	16	16	16	16
7	16	16	17	15	16	16	16	15	16	16	14	13	16	9	15	16	12	16	16	16	16	16	16	16
8	16	16	16	15	16	15	16	16	16	16	16	16	15	17	17	16	16	16	16	16	16	16	16	16
9	16	16	16	17	16	16	16	16	16	16	16	14	16	16	16	16	16	15	15	16	16	16	16	16
10	16	16	16	16	16	15	15	16	14	16	16	13	16	16	16	16	16	15	15	16	16	17	16	16
11	16	16	16	16	16	16	16	16	16	16	15	17	16	16	14	16	16	16	16	16	16	16	16	15
12	16	16	16	16	15	16	16	16	14	16	10	11	16	10	16	16	16	15	16	16	16	16	16	16
13	16	16	16	16	15	16	16	11	15	12	16	13	12	14	14	12	16	16	16	16	16	16	16	16
14	16	16	16	16	17	12	16	16	14	14	16	15	11	15	15	16	15	17	16	17	16	16	16	16
15	197	16	16	17	15	16	14	16	15	15	16	16	14	14	15	15	16	16	16	16	16	16	16	16
16	15				16	16	16	16	15	16	15	14	16	16	12	11	11	16	16	16	16	16	15	16
17	16	16	16	16	16	16	15	16	15	9	C	15	15	10	10	11	16	16	16	16	16	15	16	16
18	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	15	16	16	16	16	16	16	16	16
19	16	16	16	16	16	16	16	16	15	15	17	11	14	14	14	15	16	16	16	16	16	16	17	17
20	16	16	16	16	17	16	16	16	14	16	16	16	16	16	15	15	16	16	16	16	16	16	16	15
21	16	16	16	16	16	15	16	16	16	14	15	15	19	16	16	15	16	16	17	16	16	16	16	16
22	16	16	16	16	16	16	16	16	16	16	16	16	16	16	19	16	14	15	16	13	16	13	16	16
23	16	17	16	16	16	16	16	16	15	16	16	17	17	15	15	16	12	16	16	16	16	16	17	15
24	16	15	16	16	16	16	16	16	16	16	16	23	17	16	17	21	15	15	16	16	15	16	16	16
25	16	16	16	16	15	15	16	16	12	14	16	16	14	11	14	14	12	16	16	15	15	16	16	16
26	16	16	16	15	16	16	16	15	15	14	16	16	15	15	15	15	16	16	15	16	16	16	16	16
27	16	16	16	16	16	16	16	16	14	14	16	16	16	16	16	16	16	16	16	16	15	17	17	17
28	16	16	16	16	16	17	15	15	16	15	15	14	15	15	15	15	16	16	16	15	15	15	15	16
29	17	16	16	15	15	15	17	16	16	15	15	15	16	16	16	16	15	16	16	17	17	17	17	16
30	16	16	16	16	16	15	17	17	15	15	15	15	15	17	16	15	13	16	17	17	16	17	17	16
31	16	15	16	16	16	16	16	17	17	16	16	17	18	15	15	15	15	16	16	16	16	16	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	29	31	31	31	31	31	31	30	31	31	31	31	31	31	31	31	31	31	31	31	31
MED	16	16	16	16	16	16	16	16	15	15	16	15	16	16	15	16	16	16	16	16	16	16	16	16
U Q	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
L Q	16	16	16	16	16	15	16	15	15	14	15	14	15	14	14	15	15	16	16	16	16	16	16	16

DEC.2017 fmin (0.1MHz)

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IONOSPHERIC DATA STATION Wakkanai

DEC. 2017 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	R	F	F	F	F	F	F	F
2	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
3	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
4	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
5	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
6	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
8	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
9	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
10	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
11	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
12	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
13	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
14	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
15	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
16	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
17	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
18	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
19	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
20	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
21	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
22	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
23	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
24	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
25	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
26	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
27	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
28	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
29	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
30	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
31	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	30	30	29	31	31	31	31	31	31	30	30	30	31	31	31	30	30	27	31	29	31	31	31
MED	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
U Q	304	319	311	316	317	341	347	380	397	384	374	378	382	381	388	395	382	362	348	349	351	327	317	308
L Q	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	275	284	284	286	295	311	313	346	380	359	358	356	359	357	362	371	356	322	308	324	324	302	284	275

DEC. 2017 M(3000)F2 (0.01)

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DEC. 2017 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L			L			L							
2											L	409	L	L	404		L							
3									L			L	L	L										
4									L			L	L	L										
5								L			L	L	L	414										
6											L	L	L	L	L									
7											L	L	L				L	L						
8									L	L	L	L	L	L										
9											L		L		L									
10												L	L											
11										L	417	L	L	L										
12												L			L									
13												L	L	L	L									
14												L	L											
15														L										
16													L	L										
17											C	L		L										
18													L	L	L	L								
19									L	L	L	L		L	L	429								
20										L	L	L	L	L	L									
21										L		L	L		L									
22												L	L	L										
23										L	L	L	L	L		L								
24												391	L	L	L									
25									L			L		L										
26										L	L	L	L	L	L	A								
27										L	L	L	L	L										
28											L				L									
29													L				A							
30											L	L	L	L	L									
31										439		L	L		L		L							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									1		1	2		1	1	1								
MED									439		417	400		414	404	429								
U Q																								
L Q																								

DEC. 2017 M(3000)F1 (0.01)

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DEC.2017 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										216	234			220			258							
2											212	212	234	234	218		218							
3									214			244	222	230										
4									212			230	236	236										
5								250			258	220	240	236										
6											234	224	224	216	226									
7											226	226	218				228	242						
8									212	212	222	232	216	212										
9											228		228		204									
10												222	206											
11										214	232	220	232	204										
12												238			222									
13												222	236	238	216									
14											220	220												
15														220										
16													218	250										
17											C	236		220										
18													236	228	218	218								
19									206	216	216	226		226	216	194								
20										206	232	226	236	262	216									
21										216		244	228		228									
22												228	228	268										
23										218	228	228	220	228		224								
24												236	236	236	228									
25									200			224		238										
26											230	224	238	238	232	218	322	A						
27										272	272	240	234	222										
28											244				232									
29													218					A						
30												228	228	218	212	212								
31										202		236	226		202		278							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	6	9	16	24	23	23	13	4	4	1						
MED							250	209	216	230	227	228	228	218	221	243	242							
U Q								212	224	235	236	236	236	227	273	268								
L Q								202	213	225	223	218	220	216	206	223								

DEC.2017 h'F2 (KM)

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IONOSPHERIC DATA STATION Wakkanai

DEC. 2017 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	Q	Q	Q																A		Q	Q	Q	Q		
	244	244	286	248	218	216	206	194	204	174	204	226	210	208	216	200	222	226		226	214	208	230	274		
2	Q	Q	Q																			Q	Q	Q	Q	
	290	284	256	250	254	250	216	198	198	216	212	212	194	202	202	194	188	212	252	236	232	212	216	244		
3	Q	Q	Q																			Q	Q	Q	Q	
	238	248	276	264	230	216	212	210	192	206	234	194	202	198	204	190	204	278	212	212	206	224	224	262		
4	Q	Q	Q																			Q	Q	Q	Q	
	248	248	246	204	204	202	204	194	190	202	226	198	198	198	224	204	182	208	208	238	202	220	234	244		
5	Q	Q	Q																			Q	Q	Q	Q	
	260	248	256		210	204	212	204	222	222	198	194	186	190	236	208	208	216	216	260	248	256	266	248		
6	Q	Q	Q																			Q	Q	Q	Q	
	242	224	226	280	234	196	228	222	232	210	192	198	196	206	200	208	200	200	214	210	228	248	276	276		
7	Q	Q	Q																		Q	A	Q	A	Q	
	278	256	266	242	254	200	222	184	202	210	196	202	192	210	224	202	194	210	206	222	220	220		246		
8	Q	Q	Q																			Q	Q	Q	Q	
	272	272	264	228	198	214	242	226	196	174	186	172	178	190	218	212	280			204	240	198	196	246	216	
9	Q	Q	Q																			Q	Q	Q	Q	
	226	286	258	238	248	250	216	200	204	198	196	214	194	200	194	202	188	194			224	202	244	270	240	
10	Q	Q	Q																			A	Q	Q	Q	
	240	240	240	250	264	250	238	216	194	200	226	206	176	210	216	196	200	200				236	230	240	264	264
11	Q	Q	Q																							
	256	254	232	232	260	238	240	206	206	186	190	190	204	214	194	200	206	198	260	256	228	210	266	236		
12	Q	Q	Q																							
	242	222	244	236	248	204	230	220	202	216	224	198	212	202	202	202	190	204	220	232	218	218	250	242		
13	Q	Q	Q																			Q	Q	Q	Q	
	240	228	252	258	280	252	222	212	220	208	220	200	198	202	198	198	182	206	236	230	230	222	248	222		
14	Q	Q	Q																			Q	Q	Q	Q	
	240	256	250	230	214	232	236	210	194	194	224	214	204	220	202	196	186	248	230	242	224	198	222	246		
15	Q	Q	Q																							
	208	242	252	252	222	202	228	198	190	198	222	222	224	202	220	202	182	226	226	226	214	208	242	222		
16	Q	Q	Q																							
	262				226	214	212	212	198	206	220	242	198	192	212	216	184	228	214	232	214	228	218	250		
17	Q	Q	Q																							
	242	246	256	248	248	206	228	204	204	214		C	192	234	216	232	232	194	230	216	E B	240	232	218	280	264
18	Q	Q	Q																							
	248	246	262	266	252	224	228	244	202	210	208	230	184	206	200	192	218	234	246	250	218	236	232	248		
19	Q	Q	Q																							
	248	272	264	274	230	262	230	200	200	178	186	204	208	208	208	188	212	222	210	202	E B	230	216	226	226	
20	Q	Q	Q																							
	222	232	268	244	244	216	204	212	218	194	204	192	198	242	200	204	190	216	210	238	206	240	246	216		
21	Q	Q	Q																							
	224	242	240	226	268	268	220	208	206	194	214	192	190	218	206	200	194		A	258	200	204	248	270	286	
22	Q	Q	Q																							
	238	278	232	220	230	230	250	198	206	234	216	202	202	194	194	208	208	198	226	224	A	216	216	258		
23	Q	Q	Q																							
	258	274	256	272	244	226	242	206	196	188	192	202	202	194	224	196	200	200	212	218	A	268	240	262		
24	Q	Q	Q																							
	262	244	244	232	246	256	206	226	200	220	220	198	194	190	208	208	196	200	244	222	238	260	260	268		
25	Q	Q	Q																							
	266	266	256	234	204	218	250	220	194	222	206	206	222	206	210	210	220	204	232	224	198	218	242	230		
26	Q	Q	Q																							
	248	260	260	242	284	202	248	230	196	196	200	200	198	182	198		A	198	198	202	E B	268	252	238	234	
27	Q	Q	Q																							
	270	248	264	248	216	202	246	224	204	204	204	196	196	200	212	220	192	200	222	208	182	190	242	256		
28	Q	Q	Q																							
	256	256	266	280	234	198		B	216	212	230	210	236	224	240	196	196	196	200	216	232	210	246	246	246	
29	Q	Q	Q																							
	242	270	246	246	246	232	218	212	204	214	226	216	186	212	212	214		A	B	B	224	206	206	216	234	
30	Q	Q	Q																							
	234	240	240	240	278	232	228	222	184	224	202	202	196	210	194	202	202	218		A	202	214	280	248	236	
31	Q	Q	Q																							
	238	228	226	220	232	206	202	184	166	196	186	188	202	198	276	194	220	208		A	220	210	208	268	252	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	31	30	30	29	31	31	30	31	31	31	30	31	31	31	31	30	30	28	25	31	28	31	30	31	Q	
MED	Q	Q	Q																							
	244	248	256	244	244	216	226	210	202	206	207	202	198	202	208	202	197	208	216	225	214	220	244	246		
U Q	Q	Q	Q																							
	260	266	264	255	254	238	238	220	206	216	220	214	204	210	218	208	208	224	234	238	230	244	264	262		
L Q	Q	Q	Q																							
	238	242	244	232	222	204	212	200	194	194	196	194	194	198	200	196	190	200	211	220	206	210	230	234	Q	

DEC. 2017 h'F (KM)

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DEC.2017 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1						88	B	140	114	114	104	104	120	110	100	92	A	A							
2							B	140	106	106	106	94	104	134	122	A	A	A							
3							B	B	122	118	116	112	112	104	A	108	108	A							
4							B		126	118	118	118	110	100	110	110	A	B							
5							B	122	118	118	118	A	118	122	114	104	A	A							
6							96	122	114	114	110	A	110	A	116	86	A								
7							B	A	114	A	100	100	100	92	98	102	102	A							
8							B	100	108	108	116	114	106	114	118	140									
9							A	A	A	A	116	116	116	A	116	116	B	B							
10							A	104	118	110	110	110	110	110	106	114	A	A							
11							B	102	98	110	112	112	112	112	112	A	A	A							
12							B	118	114	112	110	110	98	A	138	138	B	94							
13							B	130	106	96	108	108	108	100	100	112	B	B							
14							B	B	106	106	114	110	94	100	114	142	B	B							
15							B	A	126	118	114	110	106	106	86	96	B	B							
16							B	82	112	112	116	116	116	116	A	108	108	A							
17							B	B	108	108	C	96	112	106	112	122	A	A							
18							B	B	A	A	A	112	A	112	108	112		A							
19				110			B	A	A	116	108	110	108	114	118	118	B	A							
20							B	A	96	96	102	102	112	112	128	116	B	B							
21							B	A	128	102	106	112	106	106	108	118									
22							B	B	B	124	112	112	112	112	108	A	A	A	A						
23					B		B	B	118	112	112	112	112	112	112	112	A	A							
24							B	B	B	112	106	106	106	106	114	B	B	A							
25							B	A	122	112	112	112	112	112	102	A	A	A							
26							B	B	112	112	104	104	104	110	110	A	A	A							
27							B	96	118	110	110	112	94	94	A	A		B							
28							96	B	108	108	108	108	108	108	108	104	A	A	A						
29							B	B	106	112	104	104	104	104	104	A	A	A							
30							B	B	130	124	124	A	116	114	A	106	110	A							
31							B	102	106	106	110	110	110	102	A	A	A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT				1		1	2	11	28	28	29	28	30	28	26	22	4	1							
MED				110		88	96	118	114	112	110	110	110	110	111	112	108	94							
U Q								130	122	114	115	112	112	112	116	118	109								
L Q								100	107	108	106	105	106	105	104	104	105								

DEC.2017 h'E (KM)

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DEC. 2017 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 45°10.0'N LON. 141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	94	94	94	B	B	90	B	G	108	92	144	122	122	114	104	104	106	92	106	92	96	96	102	B
2	102	96	92	86	86	B	B	G	G	96	124	124	166	116	G	90	92	92	92	B	106	100	B	86
3	B	92	86	88	88	88	122	B	G	146	104	104	104	100	88	G	G	90	90	B	B	B	B	B
4	90	94	88	B	B	B	B	B	106	102	102	102	96	154	154	96	102	B	B	102	B	B	84	B
5	92	92	104	B	B	142	120	94	108	106	96	106	148	118	90	90	96	96	96	96	96	96	96	96
6	96	96	B	104	82	B	138	120	124	114	114	96	96	88	G	G	102	104	100	100	106	104	104	104
7	B	B	B	96	92	106	106	104	100	146	130	108	98	144	142	G	94	102	102	106	106	114	104	104
8	96	96	100	106	106	88	100	98	98	98	G	118	130	128	136	G	104	104	104	104	104	98	98	98
9	90	90	94	92	92	104	116	100	108	96	102	102	102	96	96	116	B	86	106	106	108	104	94	94
10	90	B	B	B	B	112	102	92	108	96	96	148	84	G	142	88	90	106	106	106	116	116	100	100
11	90	100	92	96	96	96	96	G	94	124	144	152	90	90	90	90	90	90	90	100	100	90	104	88
12	88	88	88	236	B	B	B	134	100	112	104	104	102	96	148	B	B	84	82	82	106	106	B	94
13	110	104	100	90	86	94	114	152	118	100	100	94	94	94	122	G	B	88	88	88	B	B	88	B
14	94	114	98	102	108	90	96	B	142	132	112	104	110	90	134	120	B	B	90	90	86	80	82	90
15	94	98	88	100	B	B	B	92	132	108	134	104	108	112	106	G	B	B	128	94	110	88	106	102
16	102	B	B	B	B	B	B	150	124	110	106	106	106	110	96	100	92	106	98	92	118	118	100	116
17	B	116	116	100	98	98	228	114	124	114	C	100	108	106	140	122	116	108	102	B	102	98	98	110
18	114	108	B	108	108	140	94	108	104	102	102	104	104	132	148	B	B	112	102	102	96	102	B	102
19	94	104	104	98	104	104	104	104	104	146	156	156	134	150	128	110	86	92	92	B	92	92	86	92
20	94	106	100	100	100	116	116	92	112	94	104	86	114	146	146	G	B	B	B	B	84	B	B	84
21	B	B	108	104	112	B	B	92	G	94	100	106	132	114	124	B	B	112	124	B	86	100	94	94
22	94	94	84	106	106	106	100	156	G	106	106	138	98	104	98	98	98	94	94	Q	94	90	90	90
23	90	90	90	90	108	108	96	B	G	150	134	110	110	110	110	104	104	106	100	Q	92	92	88	B
24	B	B	B	B	B	B	B	B	138	158	138	124	90	124	114	B	B	94	94	90	100	B	110	B
25	B	B	102	102	98	98	B	90	102	142	G	106	118	104	104	104	104	100	100	90	90	90	90	B
26	B	96	B	96	100	100	102	100	G	88	110	110	104	110	110	104	100	102	102	94	102	102	102	102
27	102	102	98	244	106	B	100	140	120	110	100	100	100	100	100	100	B	B	100	88	88	88	88	92
28	98	B	98	98	98	98	144	116	G	116	118	118	104	104	118	108	108	94	94	100	94	94	94	B
29	B	B	100	100	94	100	B	106	128	138	98	98	106	102	102	96	96	96	96	96	96	96	90	90
30	90	90	90	B	90	90	90	B	G	136	104	104	136	104	104	110	136	136	96	96	96	96	96	104
31	96	90	100	100	100	B	B	B	84	132	136	102	122	122	96	122	98	102	102	102	92	92	92	92
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	23	23	24	24	21	19	20	21	24	29	28	30	30	30	29	23	20	26	29	26	27	26	26	23
MED	94	96	98	100	98	98	107	104	108	110	106	104	106	105	114	104	99	99	100	96	96	96	95	94
U Q	98	104	100	104	106	104	130	120	124	132	135	122	118	122	135	120	104	104	103	102	106	102	102	102
L Q	90	92	90	96	91	90	100	93	103	97	102	102	102	98	103	96	92	92	93	90	92	92	90	90

DEC. 2017 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Wakkanai

DEC.2017 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.45°10.0'N LON.141°45.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F	F	F			F			L	C	H	C	C	C	C	L	L	FF	FF	F	F	FF			
2	F	F	F	F	F					L	CL	C	HL	LC		L	L	F		F	F	FF		F	
3		F	F	F	F	F	L			C	C	LC	LC	LC	L			L	F						
4	F	F	F						F	LC	C	LC	LC	LC	C	LC	L			F			F		
5	F	F	L				C	C	LC	C	C	L	L	CL	C	L	L	L	F	F	F	F	F	F	
6	F	F		F	F		HL	C	C	C	CL	L	L	L			L	L	F	F	F	F	F	F	
7				F	F	L	L	LC	LC	C	C	CL	CL	CL	CL	HL	L	L	F	F	F	F	F	F	
8	F	F	F	F	F	C	C	C	LC		C	C	C	C	C		C	L	F	F	F	F	F	F	
9	F	FQ	F	F	F	L	L	L	L	L	C	LC	LC	L	LC	C		LL	F	F	F	F	F	F	
10	F				F	L	C	C	LC	LC	H	LC		HL	LC	LC	L	F	F	F	F	F	FQ	F	
11	F	F	F	F	F	L		CC	C	H	LC	LC	LC	LC	LC	L	L	F	F	F	F	F	F	FQ	
12	FQ	F	F	F				C	FC	C	C	C	L	L	C			L	F	F	F	F		F	
13	F	F	F	F	F	LL	HL	C	L	LC	LC	LC	LC	LC	CL			L	F	F			FF		
14	F	F	FF	F	FF	F	L		C	CL	C	C	CL	C	C	C			F	F	F	F	F	F	
15	F	F	F	F				F	C	LC	C	C	C	CL	CL				F	F	F	F	FF	F	
16	F						C	C	CL	C	C	L	C	L	LL	L	L	LL	F	F	F	F	FF	F	
17		F	F	F	F	F	L	L	C	C		C	L	C	CL	C	L	L	F	F	F	F	F	F	
18	F	F		F	F	H	H	CL	L	L	LC	L	C	C	C	C		L	F	F	F	F	F	F	
19	F	F	F	F	F	C	L	L	CL	CL	CL	CL	CL	CL	C	C	LC	L	F		F	F	F	F	
20	F	F	F	F	F	L	L	C	C	C	C	C	C	CL	CL					F				F	
21			F	F	F		L		LC	L		C	C	C	C	C		LQ	F		F	F	F	F	
22	FF	FQ	F	F	F	FF	L		C	C	C	C	C	L	L	L	L	L	FF	FF	FQ	F	F	F	
23	FQ	FQ	FQ	F		F	L	L		H	C			C	L	L	L	L	F	F	FQ	FQ	FF		
24								H	H	C	C	LC	C	C	C			L	F	F	F		F		
25			F	F	F	F		LC	LC	C		C	C	C	C	C	L	L	F	F	F	F	F	F	
26		F		F	F	F	L	L	LC	C	C	C	C	C	C	L	L	LQ	FQ	F	F	F	F	F	
27	F	F	F	F	F		L	C	C	C	C	C	C	C	L	L			F	L	L	L	F	F	
28	F		F	F	F	C	C		C	C	C	C	C	C	C	C	C	L	FQ	F	F	F	F		
29			F	F	F	F		C	C	CL	LC	C	C	C	C	C	L	LQ	FQ	F	F	F	F	F	
30	F	F	F		F	F	L		C	L	C	L	C	C	L	C	C	LL	F	F	F	F	F	FF	
31	F	F	F	F	F			LC	C	C	LC	C	C	C	C	C	L	L	F	F	F	F	F	F	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT																									
MED																									
U Q																									
L Q																									

IONOSPHERIC DATA STATION Kokubunji

DEC.2017 f_{XI} (0.1MHz)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1		52	52	50	48	X	X	X											X	X	X	X	X	X	X	
2		37	35	36	36	34	32	30											34	33	37	41	32	34	31	
3		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
4		34	34	35	32	35	31	30											35	28	33	34	32	32	32	
5		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
6		35	36	38	37	34	36	34											40	40	42	36	38	37	38	
7		36	32	32	31	33	34	33											X	X	X	X	X	X	X	
8		34	38	37	33	26	25	27											X	X	X	A	X	A	X	
9		A	X	X	X	X	A	A											X	X	X	X	X	X	X	
10		X	X	X	X	X	X	X											51	X	X	X	X	X	X	
11		37	36	34	34	34	32	35											X	X	X	X	X	X	X	
12		X	X	X	X	X	X	X											45	38	34	36	41	36	39	
13		39	38	38	38	36	35	29											X	X		X	X	X	X	
14		X	X	X	X	X	X	X											41	37		38	37	31	34	
15		38	37	34	35	34	32	40											42	35	38	45	39	40	45	
16		46	46	40	43	37	34	36	X										X	X	X	X	X	X	X	
17		X	X	X	X	X	X	X											37	33	40	40	31	33	37	
18		38	38	37	36	35	34	32											35	31	29	34	36	31	37	
19		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
20		36	39	40	42	40	40	46											40	X	X	X	X	X	40	
21		44	44	40	42	37	27	25											X	A	X	X	X	X	X	
22		X	X	X	X	X	X	X											34	X	X	X	X	X	X	
23		38	38	30	42	38	40	29											45	41	36	42	28	27	31	
24		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
25		32	33	34	38	35	35	37											37	35	34	32	30	32	36	
26		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
27		38	37	35	34	36	35	29											54	X	X	X	X	X	X	
28		X	X	X	X	X	X	X	X										X	X	X	X	X	X	X	
29		36	36	37	34	34	30	31	X										X	X	X	X	X	X	X	
30		X	X	X	X	X	X	X											36	28	35	37	31	30	C	
31		33	34	35	36	28	26	26											41	28	35	37	31	30		
32		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
33		33	33	34	34	32	29	29											41	34	34	33	32	32	33	
34		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
35		36	34	36	36	33	31	35											43	40	40	37	33	34	36	
36		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
37		35	37	34	36	33	32	38											46	41	34	30	30	34	37	
38		X	X	X	X	X	X	X	X										40	37	38	37	33	35	35	
39		34	34	36	38	32	37	31	X										X	X	X	X	X	X	X	
40		X	X	X	X	X	X	X											40	41	36	35	33	36	38	
41		41	39	37	34	40	A	26											X	X	X	X	X	X	X	
42		X	X	X	X	X	X	X											A	X	X	X	X	X	X	
43		31	32	32	34	34	32	27												32	33	32	33	31	33	
44		X	X	X	X	X	X	X											A	X	X	X	X	X	X	
45		38	39	41	42	43	28	30												X	X	40	31	36	40	
46		X	X	X	X	X	X	X											X	X	X	X	X	X	X	
47		40	40	43	41	34	36	38											50	X	X	X	X	X	X	
48		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
49	CNT	30	31	31	31	31	29	30	3										3	29	30	30	30	31	29	30
50	MED	X	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X
51	U Q	36	36	36	36	34	32	30	50										51	39	36	36	36	33	33	36
52	L Q	X	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X
53		38	38	38	38	36	35	35	53										54	42	39	40	40	37	36	37
54		X	X	X	X	X	X	X	X										X	X	X	X	X	X	X	X
55		34	34	34	34	33	30	29	43										50	36	33	34	35	32	32	33

DEC.2017 f_{XI} (0.1MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2017 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F	F	F	F	36	26	22	49	55	55	68	69	63	70	54	54	52	37	33	38	30	27	26	31	
2	F	29	30	30	28	26	24	50	55	63	54	67	64	61	58	54	41	28	27	31	35	26	28	25	
3	28	28	29	26	29	25	24	42	51	54	52	59	58	62	54	53	42	30	23	27	28	26	26	26	
4	29	30	30	30	28	20	23	44	49	50	50	51	53	55	55	45	55	30	24	28	30	F	F	F	
5	26	F	26	F	27	F	20	37	52	78	78	97	83	78	68	60	64	37	32	36	38	38	30	28	
6	29	30	32	31	28	29	28	41	60	59	69	65	67	78	61	59	48	34	34	36	30	F	F	F	
7	F	26	26	25	27	28	27	46	49	52	59	65	61	63	54	49	48	32	33	36	28	27	22	F	
8	F	F	F	27	20	19	21	41	55	65	69	70	66	A	58	54	48	31	37	35	A	28	A	25	
9	A	27	26	28	27	A	A	48	54	48	54	52	64	59	53	49	45	32	27	30	30	26	26	29	
10	31	30	28	28	28	26	29	49	51	53	53	57	61	63	60	V	49	45	30	31	28	29	33	A	30
11	30	30	29	30	29	26	28	48	48	54	60	61	53	60	62	52	47	39	32	28	30	35	30	33	
12	33	32	32	32	30	29	23	43	57	57	58	56	64	75	73	56	48	35	31	A	32	31	25	28	
13	32	31	28	29	28	26	34	40	52	65	68	67	61	62	68	53	50	36	29	33	39	F	F	F	
14	F	F	33	F	31	28	F	44	53	50	59	72	69	57	60	50	42	31	27	34	33	25	27	31	
15	32	32	30	30	29	28	26	50	48	50	52	63	64	71	60	49	49	29	25	22	28	30	25	F	F
16	30	F	F	F	F	F	F	52	55	54	58	66	53	62	54	53	50	34	28	36	28	26	F	F	
17	F	F	F	F	F	21	18	38	52	48	50	61	52	54	55	56	49	28	A	27	35	31	F	F	
18	F	32	24	F	F	F	F	23	41	56	57	63	66	75	69	59	55	47	39	35	30	F	22	21	25
19	26	27	28	32	29	29	30	46	46	46	52	63	61	58	56	55	49	31	29	28	26	23	26	30	
20	32	31	28	28	30	29	23	41	52	51	60	61	57	60	64	64	48	30	27	28	35	34	30	28	
21	30	30	F	28	28	24	25	47	49	50	56	66	56	54	58	55	46	30	22	30	35	27	26	26	
22	27	28	29	30	22	20	20	40	52	52	50	71	58	64	53	54	51	V	35	22	29	31	25	24	C
23	27	27	28	28	26	23	23	42	50	46	52	57	53	53	54	57	47	35	28	28	27	26	26	27	
24	30	28	30	30	27	25	29	47	52	49	53	65	68	70	63	55	48	36	33	34	31	27	28	30	
25	29	31	28	30	27	26	31	46	56	54	68	63	64	59	55	52	51	40	35	28	24	24	28	31	
26	28	28	F	F	26	F	25	37	50	50	63	78	62	60	61	65	51	34	31	32	30	27	29	29	
27	32	29	28	F	30	25	F	47	48	59	58	A	67	73	60	56	51	34	35	30	29	27	30	31	
28	F	F	F	F	34	A	20	35	49	56	70	70	55	57	59	61	50	30	32	33	34	29	26	26	
29	25	26	26	F	F	F	25	20	42	50	52	56	62	63	59	68	V	A	28	27	26	27	25	27	
30	32	F	F	F	37	22	24	42	48	47	52	60	67	62	60	48	48	A	30	35	F	F	F	F	
31	F	F	F	F	28	F	F	54	48	54	49	76	55	54	55	56	44	33	29	30	30	32	27	25	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	21	22	22	19	27	24	26	31	31	31	31	30	31	30	31	31	31	29	30	30	28	28	23	22	
MED	30	30	28	30	28	26	24	44	52	53	58	65	62	62	59	54	48	33	30	30	30	27	26	28	
U Q	32	31	30	30	30	28	28	48	55	57	63	69	66	69	61	56	50	36	33	34	34	30	28	30	
L Q	28	28	28	28	27	24	22	41	49	50	52	61	56	58	55	52	47	30	27	28	28	26	25	26	

DEC.2017 foF2 (0.1MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2017 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											A		A											
2									L			L												
3											L	L	L											
4											L		L	L	L									
5										L	L	L	A	L	L	L								
6											L	L	L											
7								L	L	U	L	U	L	A										
8											408	392	L	A	A									
9								L	L	L	L	A	A	A	A									
10									L	L	L	U	L	U	L	L								
11									L	L	L	L	L	L										
12													A	A							A			
13									L				A		L									
14										L	U	L	L	L	L									
15														L		L								
16											L					L								
17											A	A	A	L	L									
18											L	A	U	L		L	L							
19															L	L								
20												U	L	A	A	A								
21											L		L	L	L									
22										L	L		L	A	A									
23												L	U	L	L	L	L				L			
24										L	U	L	U	L	U	L	L							
25											424	420	L	L	L									
26								L		L			L	A	A									
27											A	A	A											
28													L											
29											L	L	A											
30													L	L										
31											U	L	U	L	U	L								
											400	412	412											
CNT											4	5	3	2										
MED											U	L	U	L	U	L	U	L						
U Q											404	412	396	408										
L Q											U	L	U	L	U	L								
											416	416	412											
											U	L	U	L	U	L								
											386	400	396											

DEC.2017 foF1 (0.01MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2017 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								188	U A 244	280	A	A	A		A	A	U R 200							
2								B	A	A	A	A	R U 284	A	R U 224	A	B							
3								B	236	268	A	A	U R 308	A	A	A	B							
4								B	U R 232	260	A	308	A	U R 268	A	A	B							
5								U R 196	236	A	A	A	A	U R 276	A	R	B							
6								U R 188	A	A	A	A	A	A	A	A	A							
7								B	U R 212	252	272	A	A	U A 280	A	A	A							
8								A	244	280	A	A	A	A	A	U R 220	U A 148							
9								B	A	A	A	A	A	A	A	A								
10								B	U R 220	U R 272	A	A	A	U R 292	U R 268	224	176							
11								U R 176	U R 256	U R 280	A	A	U R 300	284	A	U R 228	U R 196							
12								B	236	A	A	A	A	A	A	A	A			A				
13								B	224	276	292	A	A	R	A	U R 220	A							
14								U R 232	U R 268	U R 308	A	A	A	A	264	U R 212	B							
15								B	U R 232	R 284	A	A	A	A	A	U R 236	B							
16								B	U R 232	U R 272	292	312	U R 332	A	R	A	A							
17								B	U R 220	260	284	U A 304	A	A	A	A	U A 160							
18								U R 184	U R 224	U R 272	A	A	A	A	A	U R 240	R							
19								B	U R 212	260	284	308	320	288	A	A	B							
20								B	U R 224	U R 272	A	A	A	A	A	A	A							
21								U R 212	U R 268	292	312	A	U R 296	R	R	U R 188								
22								B	U R 240	U R 276	A	A	A	A	A	A	B							
23								B	U R 220	U R 264	288	U R 320	U R 304	R U 272	U R 176	A								
24								B	204	R	284	332	308	A	A	U R 244	B							
25								B	216	272	300	A	292	R	A	A	A							
26								A	248	A	A	A	A	A	A	A	B							
27								B	U R 248	U R 288	A	A	A	U R 312	A	A	B							
28								B	U A 240	A	A	A	A	A	A	A	A							
29								B	A	288	A	A	A	A	A	A	A							
30								B	A	A	A	A	A	A	A	A	A							
31								B	U R 224	A	A	U R 300	U R 304	288	A	A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								5	26	22	10	8	8	9	5	9	7							
MED								U R 188	U R 228	272	290	310	306	288	268	224	176							
U Q								U R 192	U R 236	280	292	316	314	294	274	238	196							
L Q								U R 180	U R 220	264	284	306	302	282	266	220	160							

DEC.2017 foE (0.01MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2017 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
1	22	23	E B	E B	E B	20	20	22	29	32	J A	J A	36	34	32	J A	G	J A	J A	J A	25	J A	J A	J A				
2	J A	29	23	E B	J A	22	24	22	J A	27	32	34	J A	G	34	G	26	22	E B	15	22	J A	E B	20	22	22		
3	E B	E B	E B	E B	20	E B	E B	E B	27	32	33	35	G	36	34	29	J A	27	23	20	E B	E B	J A	E B	E B			
4	E B	J A	24	21	21	E B	E B	E B	G	G	J A	32	35	36	J A	G	J A	63	22	J A	J A	E B	E B	E B	21			
5	E B	16	20	E B	E B	E B	E B	G	29	31	40	41	51	45	G	G	E B	E B	E B	16	15	16	22	22	14	22	16	
6	E B	J A	E B	E B	E B	E B	E B	G	J A	36	34	32	37	J A	J A	J A	J A	E B	E B	E B	E B	E B	E B	E B	24	22		
7	22	22	J A	J A	J A	E B	20	15	24	G	30	33	29	50	32	35	43	44	28	26	22	J A	J A	J A	J A	27	27	
8	J A	27	19	J A	J A	J A	E B	E B	22	28	33	32	37	59	106	28	27	22	J A	J A	J A	J A	J A	J A	J A	J A	76	
9	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	J A	J A	J A	J A	J A	J A	J A	
10	E B	E B	E B	E B	J A	J A	E B	20	E B	19	G	G	J A	J A	J A	G	G	27	G	J A	28	22	15	16	38	56	32	
11	J A	J A	J A	J A	E B	E B	24	G	G	G	J A	J A	G	J A	34	32	G	G	J A	J A	29	21	22	20	20	20	15	
12	E B	E B	E B	E B	E B	E B	E B	22	29	33	49	48	61	68	59	49	J A	21	30	39	29	22	24	23	J A	J A	J A	
13	J A	27	21	21	J A	E B	E B	E B	27	32	35	69	44	G	J A	40	26	J A	J A	J A	J A	25	31	25	22	17	20	15
14	E B	E B	E B	20	23	E B	E B	20	22	G	G	35	36	32	30	26	20	J A	22	19	15	14	14	13	14	E B	E B	E B
15	E B	E B	E B	E B	E B	E B	E B	G	G	J A	J A	J A	J A	J A	J A	G	J A	E B	J A	25	15	24	22	E B	J A	E B	21	
16	E B	J A	E B	E B	E B	E B	J A	G	30	34	35	G	33	G	J A	J A	J A	J A	31	42	32	26	21	21	22	16	15	
17	25	J A	E B	E B	E B	22	22	20	J A	23	G	32	35	36	J A	J A	J A	J A	43	22	J A	J A	J A	J A	J A	J A	J A	
18	E B	16	23	E B	J A	J A	E B	G	G	32	35	43	39	42	30	G	G	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	
19	E B	E B	14	22	19	J A	J A	E B	E B	G	30	35	35	36	33	33	G	J A	E B	E B	E B	J A	24	E B	15	23	23	
20	E B	15	14	15	14	J A	J A	J A	E B	G	G	J A	J A	J A	J A	J A	J A	J A	41	22	30	22	15	15	16	15		
21	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	G	33	35	35	G	G	G	G	J A	J A	J A	E B	14	22	15	14		
22	E B	15	23	E B	E B	J A	J A	J A	J A	G	G	32	36	40	55	66	28	22	E B	E B	E B	E B	E B	E B	E B	E B	C	
23	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	G	34	G	G	G	J A	G	J A	20	22	14	14	20	14	15	E B	E B	E B
24	J A	E B	E B	E B	E B	E B	E B	E B	G	G	35	36	36	34	31	G	J A	E B	J A	E B	E B	E B	E B	E B	E B	E B	E B	
25	E B	E B	E B	E B	E B	E B	E B	E B	24	32	35	34	34	G	J A	36	29	J A	J A	J A	J A	21	21	15	14	14		
26	E B	15	20	22	20	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	23	23	22	J A	J A	J A	J A	J A	J A	
27	E B	E B	E B	J A	J A	E B	E B	E B	G	G	J A	J A	J A	J A	G	J A	J A	J A	23	J A	J A	22	E B	E B	E B	E B	E B	
28	E B	E B	15	20	J A	J A	J A	J A	30	34	33	36	37	J A	J A	J A	J A	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	
29	21	J A	J A	E B	E B	E B	E B	E B	J A	28	32	36	34	64	50	49	40	107	135	68	32	43	22	15	21	E B	E B	
30	E B	E B	E B	E B	J A	J A	J A	J A	26	32	34	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B
31	J A	J A	J A	E B	E B	E B	J A	G	J A	32	33	G	G	36	34	30	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23				
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30			
MED	E B	16	19	E B	18	21	16	20	19	24	32	35	36	J A	37	36	34	30	23	J A	J A	J A	22	22	22	20	18	
U Q	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
L Q	E B	E B	E B	E B	E B	E B	E B	E B	E B	G	G	33	35	34	32	30	26	G	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B

IONOSPHERIC DATA STATION Kokubunji

DEC.2017 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	20	21	E	B	E	B	E	B	
2	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	26	21	E	B	E	B	E	B	
3	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	24	24	E	B	E	B	E	B	
4	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	33	21	E	B	E	B	E	B	
5	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	E	B	E	B	E	B		
6	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	19	E	B	E	B	E	B		
7	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	27	32	28	38	30	28	28	26	
8	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	26	31	31	32	40	10	6	27	
9	A	A	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	24	16	15	16	18	20	15	15	
10	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	25	19	15	15	16	19	5	6	
11	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	21	18	15	15	15	16	15	
12	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	23	15	22	39	23	14	16	15	
13	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	28	24	20	16	19	18	18	17	
14	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	18	18	15	15	14	14	13	14	
15	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	19	15	15	15	16	16	16	16	
16	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	25	36	22	17	15	15	16	16	
17	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	18	19	A	A	E	B	E	B	
18	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	14	14	16	15	16	15	16	
19	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	19	E	B	E	B	E	B	E	B
20	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	23	18	15	15	15	15	16	15	
21	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	E	B	E	B	E	B	E	B
22	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	20	16	15	13	15	16	15	C	
23	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	29	33	16	16	14	14	15	14	
24	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	15	18	15	14	15	15	15	
25	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	30	24	29	25	16	15	15	14	
26	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	23	31	35	33	36	34	44	26	
27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	42	A	A	48	38	25	21	27	
28	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	28	31	31	34	34	38	35	29	
29	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	23	30	33	32	57	41	41	29	
30	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	24	28	31	32	31	31	39	23	
31	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	25	29	33	32	28	21	16	16	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30		
MED	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	28	32	32	32	32	29	25	21	
UQ	16	16	15	16	16	16	16	19	25	30	34	34	38	34	37	28	24	19	18	16	18	16	16	16		
LQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	G	G	G	E	B	E	B	

DEC.2017 fbEs (0.1MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC.2017 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	16	15	16	15	15	15	14	16	16	16	18	17	17	15	16	13	12	16	17	16	16	16	15
2	15	16	16	15	15	16	16	14	16	16	14	16	15	16	16	16	14	15	16	16	16	16	16	15
3	15	15	14	14	16	16	15	16	14	15	18	16	18	15	16	15	15	16	16	15	15	16	17	16
4	15	16	15	16	16	14	14	13	12	15	15	15	15	14	16	13	14	15	16	16	16	15	15	15
5	16	16	15	16	17	16	16	14	15	14	13	14	14	15	14	14	16	15	16	15	15	14	15	16
6	15	16	15	15	15	14	15	14	12	11	17	15	16	14	14	12	13	14	15	16	15	16	15	16
7	15	15	16	16	16	16	15	18	16	15	15	14	15	16	16	14	14	16	14	14	16	15	15	15
8	15	16	16	16	16	15	15	15	17	17	18	16	18	16	17	14	10	14	15	16	15	15	16	15
9	16	14	14	15	14	14	14	14	13	10	14	16	13	15	14	14	14	16	15	16	15	15	15	15
10	15	15	15	15	15	15	16	14	12	14	13	15	14	15	15	13	14	14	15	15	16	14	16	15
11	16	15	15	15	16	14	15	14	14	15	15	16	18	16	14	16	14	15	15	15	15	15	16	15
12	16	15	15	14	15	14	15	15	12	14	15	14	14	15	14	15	14	16	14	15	16	14	16	15
13	14	15	15	16	14	15	15	14	15	15	18	14	16	16	13	14	14	16	16	16	16	17	15	15
14	15	15	14	15	15	15	14	17	14	13	13	17	16	13	12	12	10	14	15	15	14	14	13	14
15	15	14	15	14	14	14	14	16	14	13	14	12	13	14	14	14	12	15	15	15	16	16	16	16
16	15	15	15	15	16	16	14	15	15	16	14	14	15	15	13	13	14	14	15	15	15	16	16	15
17	16	16	15	14	14	15	16	14	11	14	12	13	13	15	13	14	10	15	15	15	16	15	15	16
18	16	14	15	15	16	16	15	15	13	14	16	15	15	13	12	13	14	14	14	16	15	15	15	16
19	15	14	15	15	15	16	15	14	13	14	14	14	14	15	14	14	14	15	14	15	15	15	15	16
20	15	14	15	14	15	15	16	15	14	15	15	15	15	16	17	14	14	18	15	15	15	15	16	15
21	15	14	14	14	15	15	15	18	14	16	18	17	19	20	16	15	14	16	17	14	14	15	15	14
22	15	16	15	14	15	14	15	16	11	16	17	17	17	22	22	14	11	16	15	13	15	16	15	C
23	17	16	15	15	15	15	15	15	12	19	18	16	17	16	16	15	15	16	16	14	14	15	14	15
24	16	15	15	15	14	14	15	16	13	12	18	17	15	15	14	15	15	15	15	14	15	15	15	15
25	16	15	15	15	15	16	16	15	14	13	12	14	16	18	15	13	15	15	16	15	15	15	14	14
26	15	15	15	15	15	15	15	16	15	15	15	17	15	14	17	16	14	17	17	15	16	15	15	14
27	15	16	16	16	15	15	15	14	15	15	18	17	18	17	14	14	14	14	14	16	15	15	15	14
28	16	15	15	15	15	15	14	14	13	15	16	18	14	12	15	16	16	16	15	16	15	15	15	15
29	15	15	16	15	15	14	14	15	14	14	17	16	18	16	16	14	16	16	16	14	15	15	15	16
30	15	16	15	16	15	15	15	16	14	15	13	14	14	15	14	14	15	15	15	15	15	16	16	16
31	16	15	15	15	14	15	16	14	13	14	15	17	16	14	13	14	14	16	16	16	15	15	15	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30
MED	15	15	15	15	15	15	15	15	14	15	15	16	15	15	14	14	14	15	15	15	15	15	15	15
U Q	16	16	15	16	16	16	15	16	15	15	17	17	17	16	16	15	15	16	16	16	16	16	16	16
L Q	15	15	15	15	15	14	15	14	13	14	14	14	14	14	14	14	14	14	14	15	15	15	15	15

DEC.2017 fmin (0.1MHz)

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IONOSPHERIC DATA STATION Kokubunji

DEC. 2017 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F	F	F	F	316	405	303	387	388	364	381	371	354	387	375	366	396	367	344	358	354	350	307	330	
2	F	303	345	318	337	370	338	368	392	368	384	359	361	405	381	394	391	342	335	351	383	355	303	324	
3	315	308	323	318	353	338	353	377	382	398	378	377	373	394	385	385	383	344	318	350	342	355	329	327	
4	311	330	328	329	351	414	346	415	384	401	378	389	359	371	376	397	413	365	338	384	357	F	F	F	
5	308	F	331	F	361	F	363	402	331	364	315	346	362	384	369	348	395	408	333	324	315	358	332	317	
6	312	307	317	335	320	358	338	357	372	373	367	372	361	368	380	390	375	333	344	378	332	F	F	F	
7	F	314	295	313	331	317	370	410	403	372	359	370	345	390	412	392	387	361	356	383	405	405	283	F	
8	F	F	F	397	405	329	344	366	381	379	369	382	365	A	386	383	412	314	363	395	A	318	A	320	
9	A	308	321	322	348	A	A	397	382	401	402	365	352	367	370	369	395	377	347	347	339	349	336	311	
10	319	281	285	301	320	297	341	407	395	386	373	377	378	345	402	353	402	324	378	328	338	373	A	309	
11	358	338	322	311	304	303	333	413	387	391	396	395	367	323	362	391	373	376	358	365	A	307	346	311	324
12	306	309	300	327	302	315	339	380	382	385	385	356	354	349	380	414	381	352	338	A	354	355	308	303	
13	317	340	317	334	317	324	382	411	373	375	354	399	364	335	350	376	385	350	361	328	374	F	F	F	
14	F	F	310	F	305	297	F	377	406	383	363	374	389	361	373	392	353	377	313	373	387	333	329	351	
15	332	316	299	306	313	315	340	397	403	373	369	389	372	391	389	370	368	393	375	403	341	361	330	F	F
16	327	F	F	F	F	F	F	F	359	381	394	349	389	375	406	371	360	398	382	330	345	380	368	F	F
17	F	F	F	F	F	337	301	385	385	403	371	381	358	374	377	379	352	400	A	330	334	366	F	F	
18	F	339	290	F	F	F	F	376	355	362	346	348	347	373	392	394	355	395	350	361	340	F	351	290	319
19	318	312	334	340	341	331	363	397	385	404	336	377	364	376	363	363	363	330	366	331	371	328	313	314	
20	313	314	309	322	354	357	348	374	381	395	383	344	345	390	344	378	387	369	356	337	366	330	335	336	
21	346	292	F	311	302	298	340	386	389	394	375	390	383	371	364	372	377	355	311	321	346	390	315	326	
22	349	324	335	338	415	325	346	421	381	366	356	384	336	373	344	396	415	327	V	310	321	362	348	324	
23	328	310	306	322	330	338	371	402	421	405	370	374	370	367	361	359	400	376	369	335	376	360	312	308	
24	312	294	325	340	336	328	347	400	414	399	329	346	364	375	399	384	390	361	371	351	341	313	299	280	
25	306	328	307	332	349	355	381	375	395	378	385	373	388	396	351	372	379	378	375	346	330	343	358	367	
26	293	323	F	F	317	F	372	387	396	375	348	385	371	362	376	386	395	370	343	377	369	322	327	334	
27	293	313	304	F	357	328	F	374	385	355	368	A	354	367	358	374	394	352	370	365	381	296	323	312	
28	F	F	F	F	400	A	322	395	358	353	384	380	384	358	374	351	422	347	369	354	363	359	311	311	
29	290	312	282	F	F	353	316	392	383	391	381	389	366	396	393	358	V	A	378	396	355	334	361	324	
30	312	F	F	F	365	345	349	382	397	380	346	329	393	375	396	373	405	A	321	358	F	380	F	F	
31	F	F	F	F	314	F	F	380	385	377	387	358	344	374	375	390	397	390	326	380	343	365	337	314	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	21	22	22	19	27	24	26	31	31	31	31	30	31	30	31	31	31	29	30	30	28	28	23	22	
MED	313	312	314	322	336	330	346	387	385	380	370	376	364	374	375	376	391	361	352	351	354	353	323	320	
U Q	328	324	325	335	354	354	363	402	395	395	383	385	373	390	386	390	398	377	369	377	372	363	332	327	
L Q	307	308	300	313	316	316	338	375	381	372	354	359	354	367	363	363	379	346	333	335	340	334	308	311	

DEC. 2017 M(3000)F2 (0.01)

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DEC.2017 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											A		A											
2									L			L												
3											L	L	L											
4											L		L	L	L									
5										L	L	L	A	L	L	L								
6											L	L	L											
7								L	L	U	L	U	L	A										
8											411	405	L	A	A									
9								L	L	L	L	A	A	A	A									
10									L	L	L	U	L	U	L	L								
11									L	L	L	L	L	L										
12													A	A							A			
13									L				A		L									
14										L	U	L	L	L	L									
15														L		L								
16											L					L								
17											A	A	A	L	L									
18											L	A	U	L		L	L							
19															L	L								
20												U	L	A	A	A								
21											L		L	L	L									
22										L	L		L	A	A									
23												L	U	L	L	L		L						
24										L	U	L	U	L	U	L	L							
25											398	367	L	L	L									
26								L		L			L	A	A									
27										A	A	A												
28													L											
29										L	L	A												
30													L	L										
31											U	L	U	L	U	L								
											387	387	413	413										
CNT											4	5	3	2										
MED											U	L	U	L	U	L								
U Q											404	387	413	412										
L Q											U	L	U	L	U	L								
											419	408	416											
											U	L	U	L	U	L								
											392	374	380											

DEC.2017 M(3000)F1 (0.01)

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DEC.2017 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1											222		254											
2									224			232												
3											250	242	238											
4											242		264	256	228									
5											246	286	242	236	236	248								
6											238	242	240											
7									218	248	258	236	246											
8											236	230	228	A										
9									232	228	238	238	260	240	224									
10										228	232	246	234	258	210									
11										228	222	232	244	272										
12												E A 284	254							A				
13									260			244	250											
14									226	244	244	224	230											
15												230	234											
16										260			240											
17										242	236	238	256	244										
18										254	242	244	220	254										
19													234	242										
20											258	242	228	256										
21										246		224	220	238										
22										224	242		270	232	230									
23										242	238	240	244	238		220								
24									220	298	258		240	226										
25											240	242	226											
26									226	262		248	234	228										
27										242		A 242												
28												226												
29											246	240	E A 260											
30												228	248											
31											232	242	240											
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									4	9	22	18	27	17	15	3	1							
MED									225	228	242	241	241	240	236	248	220							
U Q									229	247	254	242	248	255	242	254								
L Q									221	225	238	236	234	231	228	226								

DEC.2017 h'F2 (KM)

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IONOSPHERIC DATA STATION Kokubunji

DEC. 2017 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 35°43.0'N LON. 139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
1	E A	E B	E B	E B	E B	E B	176	214	192	208	228	A	222	A	210	210	210	192	200	E A	234	196	204	204	E A	E B			
2	E B	E B	E B	E B	E B	E B	212	E B	246	204	194	218	210	194	190	206	208	202	198	E B	E B	232	224	202	206	E A	E A		
3	E B	E B	E B	E B	E B	E B	224	206	212	188	204	212	198	196	200	210	208	202	194	184	E B	238	212	216	206	E B	E B		
4	E B	E B	E B	E B	E B	E B	198	180	220	188	196	198	190	202	208	206	188	200	194	182	E B	236	202	202	202	E B	E B		
5	E B	E B	E B	E B	E B	E B	192	204	E A	246	194	218	204	222	206	A	196	190	196	198	178	206	208	E B	238	204	E B	E B	
6	E B	E B	E B	E B	E B	E B	230	240	E B	238	222	196	212	210	208	200	186	208	206	204	190	198	E B	192	184	200	212	E B	E B
7	E B	E B	E B	E B	E B	E B	236	196	E B	204	192	180	176	186	184	A	204	200	198	198	202	214	194	186	182	358	E A	E B	
8	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	202	214	210	204	194	A	A	A	H	174	206	188	234	216	202	A	200	E A	E B
9	A	E A	E A	E A	E A	E A	A	A	A	A	208	194	190	198	A	A	A	A	A	A	208	202	192	222	208	216	206	230	244
10	E B	E B	E B	E B	E B	E B	240	254	278	264	262	270	218	188	196	182	196	192	178	188	188	198	188	268	202	242	226	E A	E A
11	220	220	252	242	244	264	238	198	202	198	192	200	176	194	202	196	196	190	206	200	E B	E B	226	218	E B	E B	E B	E B	
12	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
13	E A	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
14	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
15	234	260	270	270	246	238	230	196	196	204	220	216	188	214	184	200	196	180	200	192	E B	226	208	210	260	E B	E B	E B	
16	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
17	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
18	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
19	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
20	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
21	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
22	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
23	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
24	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
25	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
26	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
27	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
28	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
29	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
30	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
31	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23					
CNT	30	31	31	31	31	29	30	31	31	31	28	27	20	25	27	31	31	29	30	30	30	31	29	30					
MED	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B	E B
U Q	268	280	278	264	248	250	254	204	208	210	216	212	201	209	208	210	200	200	200	234	216	224	212	278	286	E B	E B	E B	
L Q	234	234	246	230	210	207	212	192	196	192	192	194	186	195	188	198	192	185	206	202	200	200	228	238					

DEC. 2017 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2017 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								118	116	116	A	A	110	110	A	A	112							
2								B	120	116	114	A	110	110	110	110	B							
3								B	112	112	112	A	110	110	110	110	B							
4								B	110	110	A	110	110	A	116	A	B							
5								124	118	118	A	A	A	A	110	110	B							
6								128	118	114	116	A	A	A	A	A	A							
7								B	114	112	112	A	A		A	A	A							
8								A	116	116	116	A	A	A	A	122	110							
9								B	A	A	A	A	A	A	A	A								
10								B	112	112	A	A	A	108	112	114	114							
11								122	122	122	A	A	110	108	A	110	126							
12								B	116	120	116	A	A	A	A	A	A			A				
13								B	112	116	116	A	A		A	A	A							
14								B	112	112	112	112	A	A	116	108	B							
15								B	116	116	A	A	A	A	A	112	B							
16								B	112	108	116	108	112	112	108	A	A							
17								B	116	110	110	112	A	A	A	A	122							
18								120	118	114	114	A	A	A	A	108	110							
19								B	110	108	108	112	116	116	118	118	B							
20								B	116	110	A	A	A	A	A	A								
21								B	112	110	110	108	106	102	112	112	118							
22								B	112	112	A	118	A	A	A	102	B							
23								B	112	112	112	114	110	110	108	A	118							
24								B	110	110	110	110	110	112	A	112	B							
25								B	116	114	112	112	112	112	A	A	A							
26								A	110	110	108	A	A	A	A	A	B							
27								B	114	116	A	A	A		A	A	B							
28								B	118	112	112	112	A	A	A	A	A							
29								B	A	114	114	112	A	A	A	A	A							
30								B	122	116	108	A	A	A	A	A	A							
31								B	114	A	A	114	108	114	116	114								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								5	28	29	20	14	12	15	11	15	8							
MED								122	115	112	112	112	110	112	112	112	116							
U Q								126	117	116	115	112	111	114	116	114	120							
L Q								119	112	110	110	110	110	110	110	110	111							

DEC.2017 h'E (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2017 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	96	100	B	B	B	92	86	162	160	164	112	106	116	146	96	100	G	92	90	86	86	82	96	96
2	92	90	B	90	90	82	88	134	128	124	110	94	G	148	G	136	122	B	88	88	B	88	88	84
3	B	B	B	B	90	B	B	B	150	138	116	100	G	122	120	114	100	84	84	B	B	B	B	B
4	B	98	94	94	94	B	B	B	G	G	100	142	132	104	G	94	142	92	90	B	B	B	B	100
5	B	100	B	B	B	B	156	G	128	126	100	98	96	92	G	G	B	B	B	94	88	B	94	B
6	B	94	B	B	B	B	B	G	120	108	108	102	102	100	94	98	98	B	B	B	B	B	88	88
7	94	94	92	96	92	92	B	106	G	146	140	102	92	148	94	94	94	92	84	84	94	102	92	100
8	96	120	98	98	98	B	B	86	152	152	128	102	92	92	102	144	134	116	102	100	100	100	96	96
9	88	92	96	98	92	92	92	92	98	96	96	96	96	94	92	90	88	88	B	88	96	96	98	90
10	B	B	B	92	90	90	B	130	G	G	98	98	98	G	G	138	G	90	92	B	B	100	100	98
11	98	106	92	90	B	B	96	G	G	G	106	96	G	148	90	G	G	86	84	92	92	88	126	B
12	B	B	B	B	B	B	B	140	130	124	124	100	94	90	90	90	90	90	118	108	104	102	84	100
13	102	102	102	98	B	B	B	B	140	146	132	102	96	G	96	146	94	100	92	90	94	B	98	B
14	B	B	98	98	B	B	94	88	G	G	122	104	98	144	154	130	92	90	B	B	B	B	B	B
15	B	B	B	B	B	B	B	B	G	G	98	96	98	98	88	G	86	B	84	84	B	94	B	94
16	B	94	B	B	B	B	B	G	142	146	148	G	112	G	92	92	92	80	106	106	106	B	B	B
17	120	106	B	B	94	94	142	140	G	134	134	122	104	100	100	100	116	96	86	86	84	84	94	88
18	B	94	B	96	98	122	B	B	G	126	114	100	100	94	100	G	G	B	B	B	92	100	110	104
19	B	B	110	96	102	120	B	B	G	146	150	156	156	150	114	G	98	B	B	92	90	B	98	100
20	B	B	B	B	100	102	110	B	G	G	104	98	98	98	94	88	88	90	90	90	B	B	B	B
21	B	B	B	B	96	96	96	102	100	G	152	138	116	G	G	G	G	96	104	88	B	88	B	B
22	B	102	B	B	102	96	96	96	G	G	98	120	100	100	88	128	114	B	B	B	B	B	B	C
23	B	B	B	B	B	B	B	B	G	G	144	G	G	G	140	92	G	94	94	B	B	106	B	B
24	94	B	B	94	B	100	B	B	136	G	148	134	154	122	108	G	B	96	B	B	B	B	120	B
25	B	B	B	B	B	90	B	B	144	166	136	130	130	G	94	100	96	96	96	90	90	B	B	B
26	B	104	104	104	94	94	92	98	92	154	126	122	100	102	100	100	94	92	88	90	92	104	B	B
27	B	B	98	98	94	130	B	G	G	104	94	94	G	94	98	96	86	86	86	86	82	B	B	B
28	B	B	104	100	100	94	94	126	126	120	128	120	102	96	96	104	96	B	108	96	94	98	98	96
29	94	94	94	B	B	B	B	B	106	150	108	118	100	98	96	96	92	92	92	90	90	88	B	88
30	96	B	B	96	100	92	92	92	136	126	114	104	100	100	96	94	96	98	94	94	94	92	104	B
31	100	92	94	B	100	92	92	G	94	96	G	G	126	120	120	106	106	98	96	90	88	86	B	B
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	12	17	13	16	19	15	16	16	16	20	30	29	25	25	25	24	23	23	24	22	19	20	18	15
MED	96	98	98	96	94	94	95	100	129	136	114	102	100	100	96	100	96	92	90	90	92	97	97	96
U Q	99	103	103	98	100	96	116	132	142	148	134	122	110	124	105	124	114	96	95	94	94	101	100	100
L Q	94	94	94	94	92	92	92	92	113	124	104	98	96	97	94	94	92	90	86	88	90	88	92	88

DEC.2017 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Kokubunji

DEC.2017 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.35°43.0'N LON.139°29.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F1	F2				F1	F1	H2	H2	H2	L3	L3	C2	H2	L3	L1		F2	F2	F2	F3	F2	F2	F3	
2	F1	F2		F2	F2	F3	F1	C2	C2	C2	C2	L3		HL11		H2	C2		F1	F1		F2	F1	F2	
3					F1				H2	H2	C2	L2		C2	C2	C3	L6	F1	F1			F1			
4		F2	F1	F2	F1						L1	HL11	CL12	L2		L4	H2	F2	F3					F2	
5		F1					F1		C2	C2	L3	L2	L3	L2							F2	F2		F2	
6		F5							C2	C2	C2	L2	L2	L2	L3	L2	L2						F2	F1	
7	F1	F2	F2	F2	F3	F1		L1		HL22	HL21	L2	L3	HL12	L2	L5	L4	F3	F4	F1	F4	F3	F2	F2	
8	F2	F1	F2	F5	F6			L1	H2	H2	C2	L2	L3	L3	L2	H2	H2	F2	F2	F2	F5	F3	F4	F5	
9	F5	F4	F3	F4	F4	F5	F5	L4	L2	L3	L2	L2	L2	L2	L3	L3	L3	F3		F1	F2	F3	F2	F1	
10				F2	F2	F1		H2			L2	L2	L2			HL21		F3	F1			F3	F4	F5	
11	F2	F1	F2	F2			F3				L2	L3		HL12	L2			F4	F3	F1	F1	F3	F1		
12								H2	H3	C2	C2	L2	L5	L4	L4	L4	L2	F1	F5	F4	F5	F1	F2	F1	
13	F1	F1	F1	F2					H2	H1	H2	L2	L3		L2	H2	L2	F1	F3	F2	F1		F1		
14			F1	F3			F1	L2				C1	L2	L2	H1	H2	C1	F1	F1						
15											L2	L2	L2	L3	L3		L1		F2	F1		F1		F1	
16		F1			F1			L3		H1	H2	H2		C1		L2	L4	F3	F2	F1	F1	F1			
17	F2	F2			F1	F1	F1	H2		H2	H1	C2	L4	L2	L2	L3	C1	F2	F4	F2	F2	F2	F1	F1	
18		F1		F2	F2		F1			H2	C2	L2	L2	L3	L2						F2	F4	F2	F1	
19			F1	F1	F2	F1				H2	H1	H2	H2	H2	C2		L2			F4	F2		F1	F2	
20					F2	F1	F1				L2	L2	L2	L3	L3	L3	L3	F1	F2	F2					
21					F2	F2	F2	L2	L1		H1	H1	C1					F1	F1	F1		F1			
22		F1			F3	F3	F2	L1			L2	CL21	L1	L2	L2	C1	C1								
23											H1				H1	L2		F1	F1			F1			
24	F2			F1		F1			H2		H1	H1	H1	C1	L2			F1					F1		
25					F2			H1	H2	H2	C2	C2	C1		L2	L2	L2	F3	F3	F1	F2				
26		F2	F2	F2	F4	F3	F2	L1	L2	H2	C2	C1	L2	L2	L2	L3	L3	F2	F2	F2	F2	F3			
27			F2	F2	F2		F2				L3	L3	L4		L4	L3	L2	F3	F4	F2	F1				
28			F1	F2	F3	F7	F2	C2	C2	C2	C1	C2	L2	L2	L3	L2	L3		F1	F4	F3	F3	F2	F2	
29	F2	F2	F2					L2	H2	C2	C2	C1	L3	L3	L4	L3	L5	F6	F4	F4	F2	F3	F2	F1	
30	F1			F5	F3	F5	F4	L2	H2	C2	C2	L2	L2	L2	L3	L2	L3	F4	F2	F3	F3	F2	F2		
31	F2	F2	F1		F1		F2	F3		L4	L3			C2	C2	C3	L2	F1	F2	F2	F2	F2	F1		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT																									
MED																									
U Q																									
L Q																									

IONOSPHERIC DATA STATION Yamagawa

DEC.2017 f_{XI} (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		39	X	41	41	46	X														X	X	X	X	X
2		X	X	X	X	X	X												X		X	X	X	X	X
3		X	X	X	X	X	X														X	X	X	X	X
4		X	X	X	X	X	X														X	X	X	X	X
5		X	X	X	X	X	X													X	X	X	X	X	X
6		X	X	X	X	X	X													X	X	X	X	X	X
7		X	X	X	X	X	X														X	X	X	X	X
8		A		X	X	X	X	X	X											X	X	A	X	A	A
9		X	X	A	X	X	X													X	X	X	X	X	X
10		X	X	X	X	X	X														X	X	X	X	X
11		A	A	X	X	X	X														X	X	X	X	X
12		X	X	X	X	X	X														X	X	X	X	X
13		X	X	X	X	X	X														X	X	X	X	X
14		X	X	X	X	X	X	X													X	X	X	X	X
15		X	X	X	X	X	X														X	X	X	X	X
16		X	X	X	X	X	X														X	X	X	X	X
17		41	46	47	45	45	33														X	X	X	X	X
18		X	X	X	X	X	X														X	X	X	X	X
19		X	X	X	X	X	X														X	X	X	X	X
20		X	X	X	X	X	X														X	X	X	X	X
21																									
22		X	X	X	X	X	X	X	X												X	X	X	X	X
23		X	X	X	X	X	X														X	X	X	X	X
24		X	X	X	X	X	X														X	X	X	X	X
25		X	X	X	X	X	X														X	X	X	X	X
26		X	X	X	X	X	X														X	X	X	X	X
27		X	X	X	X	X	X														X	X	X	X	X
28		X	X	X	X	X	X														A	X	A	X	X
29		X	X	X	X	X	X	X	X												X	A	A	X	X
30		X	X	X	X	X	X														X	X	X	X	X
31		X	X	X	X	X	X														X	X	X	X	X
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT		28	29	29	30	30	30	5	5	2	1									2	6	28	28	28	29
MED		X	X	X	X	X	X	X	X	X	X									X	X	X	X	X	X
U Q		X	X	X	X	X	X														X	X	X	X	X
L Q		X	X	X	X	X	X	X	X												X	X	X	X	X

DEC.2017 f_{XI} (0.1MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2017 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F	30	F	F	F	18	19	35	52	53	66	62	62	65	60	58	59	53	31	30	32	28	25	26
2	28	29	30	34	26	22	21	38	56	52	58	71	75	60	60	60	48	46	31	29	29	28	24	23
3	25	28	29	29	30	34	23	33	54	54	58	58	58	58	55	52	50	44	28	24	29	28	23	26
4	26	26	28	30	28	28	18	32	43	50	50	52	56	59	51	55	62	44	30	26	28	22	25	22
5	24	24	25	28	21	20	18	30	40	58	68	82	83	76	65	60	81	55	34	34	35	39	26	30
6	24	25	28	31	30	30	28	38	50	59	71	72	65	62	71	62	64	43	36	29	25	24	23	24
7	26	28	28	27	30	F	20	35	46	49	56	63	75	64	58	54	46	48	A	34	24	25	A	22
8	A	F	F	41	22	19	19	31	54	59	65	59	64	61	54	57	50	40	37	38	A	24	A	A
9	22	25	A	26	26	24	23	32	56	52	50	52	A	65	64	58	54	49	28	31	32	32	F	29
10	27	27	28	26	26	28	28	34	49	51	55	59	52	60	57	51	51	44	36	31	27	33	24	24
11	A	A	28	26	26	25	23	34	52	50	58	60	59	56	66	55	48	53	33	35	19	31	30	31
12	30	30	30	31	31	30	28	36	58	58	58	58	55	73	73	57	54	46	36	32	35	29	25	26
13	28	32	32	28	28	24	25	32	43	59	74	69	60	71	71	58	60	45	33	28	31	32	28	28
14	32	32	32	32	31	29	26	34	53	52	54	56	69	68	60	50	50	47	32	32	33	29	28	30
15	30	32	31	29	29	29	26	35	52	50	59	55	71	72	57	56	70	50	38	26	26	29	28	26
16	26	27	29	27	29	26	26	34	56	54	58	52	64	55	60	59	54	46	34	28	F	F	F	F
17	F	F	F	F	F	F	24	30	44	50	52	52	55	53	59	53	54	44	33	33	33	34	23	24
18	30	36	27	25	28	29	20	34	58	59	58	60	71	78	60	55	54	47	40	39	26	30	20	22
19	26	27	28	28	30	29	28	30	53	52	54	56	64	70	58	68	57	43	29	34	27	26	24	24
20	26	28	25	24	26	29	25	30	46	52	52	54	69	62	68	59	69	45	30	28	34	37	28	28
21																								
22	30	30	28	28	26	24	22	32	50	56	53	56	61	70	68	57	52	51	26	22	27	32	26	26
23	28	28	25	F	32	30	26	32	46	47	52	47	49	49	56	65	60	46	39	36	28	28	22	24
24	28	28	31	26	28	30	34	32	48	50	47	54	72	87	55	54	57	48	39	31	35	34	38	32
25	31	32	30	30	35	24	27	35	56	53	61	78	67	62	58	60	57	56	51	29	28	27	25	27
26	27	27	28	28	28	29	27	27	48	45	54	70	68	65	58	58	57	58	31	32	34	27	29	30
27	31	32	30	30	30	25	21	31	55	54	56	57	68	82	61	58	55	47	36	30	28	26	27	28
28	31	30	30	F	F	F	F	26	47	50	60	62	55	60	64	62	62	47	34	A	31	A	23	F
29	24	25	25	25	24	24	20	27	53	53	53	64	68	58	58	51	49	A	36	37	A	A	24	25
30	F	27	27	26	28	30	18	28	49	51	51	57	61	59	65	51	56	40	34	30	33	30	21	24
31	28	26	26	26	F	F	24	31	55	55	52	52	63	62	60	57	57	38	28	30	32	34	35	24
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	25	27	26	26	26	26	29	30	30	30	30	30	29	30	30	30	30	29	29	29	27	27	26	27
MED	28	28	28	28	28	28	24	32	52	52	56	58	64	62	60	57	56	46	34	31	29	29	25	26
U Q	30	30	30	30	30	29	26	34	55	55	59	63	69	70	65	59	60	50	36	34	33	32	28	28
L Q	26	27	27	26	26	24	20	30	47	50	52	54	58	59	58	54	51	44	30	28	27	27	23	24

DEC.2017 foF2 (0.1MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2017 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L			U L 4 3 2		L								
2												L U L 4 0 0	L	L										
3												L	L U L 4 1 6	L										
4									L	L			L	L	L U L 3 6 4									
5										L	L	A U L 4 0 4 4 0 4	L	L										
6									L	L	L	L		L		L		A						
7											L	A	A	L					A					
8										L			L	A		A								
9												A	A		L	L	L							
10										L	L	L U L 4 3 6 4 0 4	L		L									
11											L	L	L	L	L									
12											L	A U L 4 2 0												
13										L		L U L 3 8 4			A		L							
14										L	L	L												
15										L	L	L		L	A U L 4 0 4	A								
16												L U L 4 0 4	L U L 4 0 8	L	L	L								
17								L			L	A	L	L	L	L								
18											L	L U L 4 3 6			A									
19									2 4 8	L	L	L U L 4 1 6	A	L	L				U L 2 2 4					
20								2 4 0				L	L		A	L								
21																								
22											L U L 3 7 6 4 5 6	L U L 4 1 6 3 8 8	L			L								
23									L		A		U L 4 1 2 4 4 0	A	A	L								
24											U L 4 0 8	U L 4 2 4 4 1 6	L	L	L			A						
25											L		A	L	L		L							
26										L	L	L	L	L	L	A	L							
27											L	A U L 4 2 8	A		A									
28											U L 4 1 2	L	L	L	L	A								
29									L			L U L 4 2 0	L	L			A	A	A					
30											L	L	L	L	L	L								
31											L	L U L 4 1 6	L U L 3 8 8	L										
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									2		2	3	15	7	3	2				1				
MED									2 4 4		U L 3 9 4	U L 4 0 8	U L 4 1 6	U L 4 1 6	U L 3 8 8	U L 3 8 4				U L 2 2 4				
U Q											U L 4 5 6	U L 4 2 4	U L 4 3 2	U L 4 0 8										
L Q											U L 4 0 0	U L 4 0 4	U L 4 0 4	U L 3 8 8										

DEC.2017 foF1 (0.01MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2017 foE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1							B	B			A	A	A	A	A	U R	U R	B	B						
2							B	B	232	256	A	A	A	A	A	A	A		B						
3							B	B	212			U A	A	A	A	A	A	A	B						
4							B	B	232	256	284	300		A	A	A	U R	U R	B	B					
5							B	B	204	260	284	296		A	A	A	U R	U R							
6							B	B	200	252	284		A	A	A	A	A	B							
7							B	B	268		U R	316	U R	328	304	A	A	A							
8							B	B	208	252	280		A	A	296	A	A	A	B	B					
9							B	A			A	A	A	A	A	A	A	A	B						
10							B	A	U R	U R	A	A	A	A	A	A	U R	A	B						
11							B	B	176	256	A	A	A	U R	A	A	A	A	B						
12							B	B	220		A	A	A	A	A	A	A	A	B	B					
13							B	B	188	244	A	A	A	A	A	A	A	A	B	B					
14							B	B	204	248	R	A	A	U A	A	A	U A	B							
15							B	B	212	264	A	A	A	A	U A	U A	A	A							
16							B	B	192	244	276	296	304		A	A	A	B	B						
17							B	B	188		A	U A	U A	U A	U A	A	A	A	B						
18							B	B	196	244	A	A	A	A	A	A	B	B	B						
19							B	B	184	244	268	A	U R	U A	U A	U A	U R	B	B						
20							B		A	A	300	312		A	A	A	U A	B	B						
21																									
22									U R	U R	A	U R	U R	U R	U A	U A	A	U R	B						
23							B	B	212		292	312	304	280	264	A	U R	B							
24							B	B	244	280	300	316		A	U A	U A	U R	B							
25							B	B	244	300	312	344	R		U A	A	A	A							
26							B	B	184	260	A	A	A	A	A	A	A	B							
27							B		A	U A	U A	U A	U A	A	A	U A	U A	A	B						
28							B	B	188	260	288	304	U A	U R	U A	A	A	B	B						
29									U R	A	A	A	A	A	A	A	A	B	B						
30							B	B	200		A	A	A	A	A	A	A								
31							B	A	184	248	U A	A	U A	A	A	A	A	A							
									252	160		A	U A	A	A	A	224	A							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									20	19	13	9	8	9	7	9	10	4							
MED									U	U	U	U	U	U	U	U	U	U							
U Q									200	252	284	300	314	304	284	268	224	184							
L Q									U R	U R	U	U R	U R	U R	U R	U R	U R	U R							
									212	260	288	312	320	310	300	280	240	188							
									U A			U A	U A	U A	U A	U A	U R	U R							
									188	244	272	296	308	300	284	266	220	174							

DEC.2017 foE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC. 2017 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
1	E B	22	J A	20	20	20	18	E B	26	G	34	J A	J A	J A	J A	G	G	E B	J A	J A	23	21	20	E B		
2	E B	15	J A	J A	20	E B	20	J A	25	32	J A	J A	J A	J A	J A	J A	J A	16	22	24	26	15	20	E B		
3	E B	16	E B	E B	E B	E B	E B	E B	G	30	36	36	39	40	36	38	28	28	23	32	23	21	16	21		
4	E B	15	E B	E B	E B	E B	J A	J A	E B	G	36	38	43	42	36	G	25	E B	E B	22	J A	E B	E B	E B		
5	20	E B	E B	J A	23	23	21	J A	30	32	36	50	43	40	52	43	24	15	15	16	15	18	18	E B		
6	E B	16	19	E B	E B	E B	E B	E B	26	G	30	G	G	G	J A	J A	J A	J A	J A	J A	19	E B	E B	E B		
7	E B	16	E B	E B	E B	E B	E B	E B	28	30	32	47	35	34	35	58	77	52	46	34	29	23	55	87		
8	J A	J A	J A	E B	20	J A	J A	E B	27	30	32	37	51	52	79	74	53	33	24	36	80	86	52	42		
9	J A	39	38	38	33	29	30	28	26	31	33	40	64	93	109	43	43	40	72	27	40	26	26	19	E B	
10	E B	15	E B	E B	J A	E B	J A	J A	J A	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B	J A		
11	J A	J A	J A	23	23	E B	E B	E B	G	32	40	42	40	G	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B		
12	E B	16	E B	21	16	16	16	16	22	24	32	36	43	39	39	35	35	42	27	24	46	22	48	26	26	
13	22	J A	J A	46	38	20	22	21	22	G	32	37	36	49	42	64	42	25	15	28	28	22	15	20	J A	
14	E B	16	J A	21	E B	E B	E B	E B	G	G	G	J A	40	40	33	34	43	26	26	16	16	23	19	19	E B	
15	E B	15	21	E B	21	E B	E B	E B	G	G	35	50	38	43	37	34	J A	56	52	34	23	22	21	21	21	
16	E B	16	J A	J A	E B	J A	E B	E B	24	28	33	34	35	43	54	31	28	22	16	16	15	15	16	20		
17	E B	16	J A	J A	J A	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	41	52	29	22	31	28	25	23	20
18	20	E B	16	20	20	20	25	16	21	22	30	32	36	43	50	91	55	82	46	34	34	20	20	16	16	
19	E B	16	21	21	E B	E B	E B	E B	G	G	G	30	G	37	36	30	27	E B	15	22	E B	20	20	J A	J A	
20	J A	J A	J A	23	18	20	20	25	28	24	34	33	35	41	65	62	51	28	46	25	31	28	25	25	22	
21																										
22	21	E B	16	19	E B	E B	E B	J A	G	G	G	J A	38	36	G	33	31	27	G	J A	E B	E B	E B	E B		
23	E B	15	E B	E B	E B	20	20	19	19	J A	J A	J A	J A	J A	J A	J A	J A	25	G	E B	21	16	16	29		
24	20	E B	16	20	E B	16	22	18	21	20	22	28	34	35	G	G	J A	36	31	28	37	22	16	15	15	15
25	18	E B	E B	E B	E B	E B	E B	E B	E B	21	31	38	44	72	60	53	44	26	31	15	20	16	16	16	16	
26	J A	J A	E B	15	22	22	J A	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	24	27	22	22	23	E B	23	15	
27	E B	16	20	23	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B	E B	E B	
28	E B	15	E B	E B	E B	E B	20	J A	21	27	31	36	34	36	37	35	35	33	J A	J A	J A	J A	J A	J A	J A	
29	J A	J A	J A	E B	E B	20	22	E B	G	28	31	38	40	37	40	39	44	153	78	63	53	32	31	23		
30	18	19	E B	E B	E B	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	20	J A	J A	E B	E B	
31	J A	23	E B	E B	E B	E B	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23		
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
MED	E B	16	20	20	E B	E B	20	18	20	24	30	34	38	39	40	42	28	J A	J A	J A	22	20	19	20		
U Q	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
L Q	E B	16	E B	E B	E B	E B	E B	E B	E B	G	G	32	36	36	36	36	33	26	E B	E B	E B	E B	E B	E B	E B	

DEC. 2017 foEs (0.1MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2017 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	G	G	E	B	E	B	E	B	E	B	
2	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
3	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
4	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
5	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
6	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
7	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
8	A	A	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
9	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
10	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
11	A	A	A	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B
12	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
13	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
14	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
15	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
16	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
17	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
18	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
19	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
20	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
21																											
22	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
23	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
24	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
25	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
26	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
27	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
28	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
29	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
30	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
31	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
MED	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
UQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	
LQ	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	E	B	

DEC.2017 fbEs (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Yamagawa

DEC.2017 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	16	16	16	16	16	16	15	15	16	16	20	18	16	22	21	18	16	16	16	16	15	16	16
2	15	15	16	15	16	15	16	16	16	14	15	16	16	16	18	18	16	16	16	15	15	15	15	15
3	16	16	15	15	16	16	16	16	15	15	16	15	15	16	16	16	16	15	16	16	16	16	16	16
4	15	15	15	15	16	16	15	16	16	16	17	16	16	17	15	16	14	16	16	16	16	15	15	15
5	16	16	16	16	16	16	16	16	14	16	15	18	17	15	15	15	14	15	15	16	15	15	16	16
6	16	16	15	15	16	16	16	15	14	14	13	13	12	12	14	12	12	16	15	16	15	15	15	15
7	16	16	16	16	16	15	15	15	15	15	15	16	16	16	13	14	14	15	15	15	15	15	15	15
8	16	16	16	16	16	16	16	16	15	15	12	14	18	19	16	14	16	15	15	15	15	16	16	16
9	15	15	15	16	16	16	16	15	15	16	16	13	13	15	15	14	16	16	15	15	16	16	16	16
10	15	16	16	16	16	15	16	16	15	14	13	12	11	14	12	13	13	14	16	16	15	15	16	15
11	16	16	16	16	15	16	16	16	15	16	16	14	14	14	15	13	13	15	16	16	16	16	16	16
12	16	16	16	16	16	16	16	16	13	14	14	14	15	15	14	14	14	14	16	16	16	15	16	16
13	16	16	16	16	16	16	16	16	15	14	14	16	16	18	15	15	15	15	14	16	16	15	16	16
14	16	16	16	16	15	16	15	15	16	15	15	14	16	16	16	14	15	16	16	16	16	16	16	16
15	15	15	16	15	15	15	15	15	15	14	14	15	18	18	16	15	15	15	15	15	15	15	15	15
16	16	16	16	16	16	16	16	15	14	14	15	15	18	14	15	16	16	15	16	16	15	15	16	16
17	16	16	16	16	16	16	16	16	15	16	16	16	14	13	14	15	15	15	16	16	16	16	16	16
18	16	16	16	16	16	16	16	15	15	14	14	14	14	14	14	14	14	16	15	15	15	16	16	16
19	16	16	16	16	16	16	16	16	14	14	14	15	15	15	14	14	14	15	15	15	15	16	16	16
20	16	16	16	16	16	16	15	15	14	14	14	14	14	14	14	14	14	14	16	16	16	16	16	16
21																								
22	16	16	15	15	15	15	15	15	15	15	20	20	21	21	16	16	14	13	13	15	15	14	14	14
23	15	15	15	15	15	16	16	16	15	15	15	14	16	18	14	14	14	14	16	16	16	16	16	16
24	16	16	16	16	16	16	16	16	16	15	15	15	15	16	14	14	15	15	15	16	15	15	15	15
25	16	16	16	16	16	16	16	16	16	15	14	14	14	14	16	16	14	14	15	16	16	16	16	16
26	16	15	15	16	16	15	15	15	16	15	15	15	13	15	15	15	14	15	15	15	16	16	16	15
27	16	16	16	16	14	16	16	16	14	15	14	15	16	17	17	17	14	15	16	16	16	16	16	16
28	15	15	15	15	16	16	16	16	16	15	15	16	18	16	14	14	14	15	15	14	16	16	16	16
29	16	16	16	16	16	16	16	16	15	15	15	16	15	15	15	15	15	15	15	15	15	15	15	15
30	15	16	15	15	15	15	16	15	15	15	14	15	16	16	16	16	16	16	16	16	16	16	16	16
31	16	16	16	16	16	16	16	15	15	15	15	15	16	15	16	14	15	16	16	16	16	16	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
MED	16	16	16	16	16	16	16	16	15	15	15	15	16	16	15	14	14	15	16	16	16	16	16	16
U Q	16	16	16	16	16	16	16	16	15	15	15	16	16	16	16	16	15	16	16	16	16	16	16	16
L Q	15	16	15	15	16	16	16	15	15	14	14	14	14	14	14	14	14	15	15	15	15	15	15	15

DEC.2017 fmin (0.1MHz)

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IONOSPHERIC DATA STATION Yamagawa

DEC. 2017 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	F		288	288	F	F	F	478	341	355	386	376	386	394	356	381	381	345	366	377	333	344	390	332	316	312
2		311	314	325	366	324	335	349	372	370	394	388	394	374	342	368	361	405	391	351	375	358	352	321	333	
3		330	308	324	312	332	396	360	377	385	387	409	381	381	375	358	402	389	401	410	307	353	359	305	329	
4		309	308	299	367	339	421	384	382	402	378	378	373	388	381	367	380	387	410	356	340	370	338	355	323	
5		315	287	333	421	363	391	331	364	385	339	342	350	363	340	369	333	388	389	375	336	316	385	308	328	
6		344	311	312	333	316	316	325	356	376	381	366	387	343	359	355	350	391	390	398	378	393	296	325	313	
7		296	316	302	317	342	F	307	344	392	379	368	350	354	370	394	351	368	390	A	348	361	354	A	294	
8	A	F	F	F	386	361	321	321	374	381	383	382	398	387	377	380	371	370	351	325	380	A	387	A	A	
9		301	324	A	318	318	342	339	371	370	370	380	405	A	392	372	372	379	410	365	326	350	351	F	330	
10		341	315	329	312	327	329	349	402	385	377	377	376	369	360	383	380	397	379	348	345	308	372	389	343	
11	A	A	341	331	337	325	324	358	395	383	393	383	385	371	355	394	363	378	403	381	405	344	325	352		
12		339	339	339	338	325	291	321	364	373	374	397	377	355	357	390	389	379	364	359	313	376	367	301	304	
13		301	336	348	317	328	296	356	379	369	351	390	393	354	368	379	374	381	373	359	349	356	348	347	287	
14		313	319	331	305	313	317	308	346	392	382	402	372	362	379	385	365	376	366	332	332	361	344	340	346	
15		320	340	319	287	306	346	371	366	390	375	377	361	387	382	361	335	367	408	377	339	326	332	347	368	
16		318	313	336	327	339	351	337	378	417	367	390	390	367	365	377	369	395	380	375	309	F	F	F	F	
17	F	F	F	F	F	F	F	350	384	382	386	386	387	368	379	383	372	372	368	315	356	357	386	385	284	
18		297	359	355	300	341	384	290	323	349	382	376	352	379	384	398	363	367	360	357	367	283	367	356	298	
19		296	326	316	320	349	371	381	347	403	409	378	348	356	384	334	383	373	401	339	373	377	331	329	303	
20		317	342	331	300	341	404	400	348	384	391	387	354	379	362	381	370	397	389	338	331	353	386	326	327	
21																										
22		331	333	295	316	335	358	384	361	384	385	365	343	360	361	372	392	401	376	412	395	330	380	339	340	
23		324	326	322	F	336	354	351	353	399	390	386	353	321	331	362	375	409	358	380	364	409	409	344	322	
24		319	326	346	306	330	330	411	361	400	382	353	345	347	376	400	371	379	373	374	311	349	354	317	319	
25		303	332	331	333	360	373	340	351	390	392	375	376	374	366	379	383	369	365	396	324	316	353	333	372	
26		316	324	330	293	301	359	344	360	365	394	348	375	376	387	350	372	380	398	342	346	372	325	342	319	
27		317	359	328	297	323	336	350	329	385	391	378	364	347	371	388	373	347	394	371	361	339	331	336	306	
28		318	297	306	F	F	F	F	371	397	352	371	378	364	366	376	355	389	382	354	A	304	A	319	F	
29		322	317	317	309	338	352	317	365	382	384	350	365	371	345	384	378	394	A	395	384	A	A	365	326	
30	F	308	317	332	363	411	312	322	379	368	398	364	381	391	375	374	397	402	364	344	361	377	372	313		
31		324	325	300	301	F	F	297	329	392	379	371	377	380	357	392	377	369	422	352	323	344	369	405	300	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		25	27	27	26	26	26	29	30	30	30	30	30	29	30	30	30	30	29	29	29	27	27	26	27	
MED		317	324	325	317	336	352	341	361	385	382	378	376	368	370	378	372	380	382	359	345	356	354	338	322	
U Q		324	333	333	333	341	384	358	372	392	387	388	387	380	381	384	380	394	400	378	370	372	377	355	333	
L Q		306	311	312	305	324	329	321	348	379	375	371	354	356	360	367	363	369	370	345	328	330	338	321	304	

DEC. 2017 M(3000)F2 (0.01)

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DEC.2017 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										L	L			U L 400		L									
2												L U L 409	L	L											
3												L	L U L 394	L											
4									L	L			L	L	L U L 421										
5										L	L	A U L 398	391	L	L										
6									L	L	L	L		L		L		A							
7											L	A		A	L					A					
8										L			L	A		A									
9												A	A		L	L	L								
10										L	L	L U L 415	448		L										
11											L	L	L	L	L										
12											L	A U L 432													
13										L		L U L 438			A		L								
14										L	L	L													
15										L	L	L		L	A U L 439	411	A								
16												L U L 438		L U L 423		L									
17								L			L	A	L	L	L	L									
18											L	L U L 361			A										
19								446		L	L	L U L 399		A	L	L				U L 414					
20								454				L	L		A	L									
21																									
22											L U L 400	L U L 400		L U L 390	423	L									
23									L			A		U L 412	375	A	A	L							
24											U L 435	393	382	U L 382	L	L			A						
25											L		A	L	L		L								
26										L	L	L	L	L	L	A	L								
27											L	A U L 379		A		A									
28											U L 394	L	L	L	L	A									
29								L				L U L 405		L	L			A	A	A					
30											L	L	L	L	L	L									
31											L	L U L 431		L U L 421		L									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									2		2	3	15	7	3	2				1					
MED								450			U L 397	U L 409	U L 405	U L 391	U L 423	U L 416				U L 414					
U Q											U L 435	U L 432	U L 400	U L 423											
L Q											U L 400	U L 393	U L 382	U L 421											

DEC.2017 M(3000)F1 (0.01)

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DEC.2017 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1										240	238			238		250									
2											238	228	238	252											
3												226	234	244	248										
4									220	228			234	234	244	242									
5										266	276	266	240	254	230	276									
6									238	240	238	238		250		262		214							
7											238	252	242	230	230					A					
8										234			234	220		E A 244									
9												232			232	244	236								
10										238	242	242	266	256	240										
11											240	240	240	242	242										
12											230	228	246												
13										258		226	226		226		226								
14										226	226	238	238												
15										226	226	248	226	226	226	272	222								
16												222	238	238	234	234									
17									228		236	228	232	232	254	248									
18											248	272	248		230										
19									224	224	246	256	246	234	280	242				258					
20									224			250	250		224	238									
21																									
22											214	234	284	262	242	236	224								
23									212		228		304	302	E A 262	234	232								
24												284	270	224	224	232		224							
25											238		242	242	242		236								
26										212	238	238	238	238	238	216	216								
27											254	244	264	226		218									
28											230	226	254	254	240	240									
29									228			232	232	232	232		E A 246		A	218					
30											232	240	248	248	234	234									
31											250	234	246	230	228	234									
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT									7	12	21	25	27	24	23	19	7	2	2						
MED									224	231	238	238	242	238	234	239	229	219	238						
U Q									228	240	244	251	250	249	242	248	236								
L Q									220	225	231	228	234	231	230	234	222								

DEC.2017 h'F2 (KM)

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IONOSPHERIC DATA STATION Yamagawa

DEC. 2017 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 31°12.0'N LON. 130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	E B	E B	E B	E B			E B															E B	E B	E B	E B
	284	284	276	246	222		184	296	208	198	186	206	206	222	182	208	204	202	202	194	198	198	240	240	260
2	E B	E B	E A				E B																E B	E B	E B
	258	258	256	216	222		238	238	212	202	202	196	192	204	176	224	220	208	208	228	214	224	216	232	268
3	E B	E B	E B	E B	E B		E B													E B			E B	E B	E B
	268	268	256	256	246		198	240	194	204	214	212	188	198	188	188	206	200	190	186	270	222	222	220	228
4	E B	E B	E B	E B	E B		E B																E B	E B	E B
	272	254	250	216	216		174	210	184	172	172	206	224	204	204	192	192	208	190	200	200	192	210	230	262
5	E B	E B					E B															E B	E B	E B	E B
	300	288	248	184	208		196	296	204	200	214	230		202	200	184	202	202	200	180	228	250	198	236	236
6		E B	E B	E B	E B		E B													A			E B	E B	E B
	222	286	286	244	250		240	230	212	194	194	206	196	196	196	220	208	208		198	196	196	260	218	288
7	E B	E B	E B	E B	E B																		E A	E B	E B
	304	272	266	278	230		192	218	218	206	206	206		202		192	208	208	200		200	200	266		322
8		E B					E A	E B															A	A	A
		284	244	194	178		276	276	212	202	184	206	206	206		218		196	208	208	208				
9	E A	E A					E B	E B	E B															E B	E B
	310	262		262	262		252	232	220	200	198	198			216	208	200	196	190	198	248	216	214	208	208
10		E B	E B	E B	E B		E B																		
	222	268	240	282	270		242	214	188	196	184	194	194	188	188	178	204	198	204	194	194	202	202	192	216
11		E B	E B	E B	E B		E B																E B		
		248	246	254	254		242	208	204	200	200	196	200	178	198	198	210	192	180	184	190	230	220	220	220
12	E B	E B					E B																E A	E A	E B
	220	220	220	224	242		252	218	198	206	206	196		194	222	212	212	212	200	200	232	212	212	278	254
13	E B	E B					E B																E B	E B	E B
	260	248	220	244	242		292	216	194	198	204	212	196	178	220		206	182	180	206	206	216	186	194	284
14	E B	E B	E B	E B	E B		E B																E B	E B	E B
	252	240	240	252	258		258	258	220	196	184	184	190	190	214	214	192	200	198	196	210	196	222	218	218
15	E B	E B	E B	E B	E B		E B																		
	218	218	250	272	266		226	214	208	204	184	188	188	188	200		188		200	192	220	212	216	214	214
16	E B	E B	E B	E B	E B																			E B	E B
	258	266	252	252	218		220	208	200	194	194	204	166	176	192	176	200	198	192	182	220	220	198	198	230
17	E B	E B					E B																	E B	E B
	234	256	204	204	204		202	202	194	176	210	192		188	198	202	202	202	180	204	204	204	202	200	286
18	E B						E B	E B	E B														E A	E B	E B
	276	222	204	280	236		194	236	236	210	210	210	204	204	218		218	212	204	204	196	284	198	208	320
19	E B	E B	E B	E B	E B																			E A	E A
	304	272	268	254	222		210	206	206	184	184	180	164	190		200	200	200	190	182	194	194	220	242	322
20	E B						E B																	E B	E B
	266	234	232	284	254		190	190	212	182	196	204	204	210	214		198	198	198	198	222	212	202	202	254
21																									
22			E B	E B	E B																				
	230	222	262	248	238		220	208	208	200	182	182	190	198	178	178	178	200	200	200	200	236	210	222	226
23	E B	E B	E B	E B	E B																			E B	E B
	266	250	248	248	216		206	204	204	172	196		202	190	190			186	186	186	212	194	194	222	292
24	E B	E B					E B																E B	E B	E B
	248	234	220	256	262		228	190	190	190	196	196	196	196	192	180	188	206		206	238	216	208	228	238
25	E B	E B	E B	E B	E B																				
	266	234	224	248	216		210	224	214	210	204	200	218		194	198	218	206	206	182	182	182	212	212	212
26	E B	E B	E B	E B	E B																				
	244	246	246	278	268		232	200	212	196	172	166	196	194	192	188		186	194	190	204	200	232	216	226
27			E B																					E B	E B
	228	214	216	266	230		192	208	208	208	204	204		216		216		208	200	212	212	212	224	218	242
28	E B	E B	E B	E B	E B		E B																	E B	E B
	236	254	254	246	214		224	224	224	210	210	196	196	200	208	200			200	210	244	210		220	276
29	E B	E B	E B	E B	E B		E B																		
	290	266	266	266	260		228	290	220	196	196	196	200	200	190	190	204					204		218	230
30	E B	E B	E B	E B	E B		E B																	E B	E B
	290	266	264	254	234		182	290	234	210	210	208	194	208	210	190	190	196	180	194	212	206	206	206	250
31	E B	E B	E B	E B	E B		E A																	E B	E B
	232	258	258	244	230		208	262	220	206	206	200	176	176	182	182	194	200	200	198	198	202	210	202	298
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	28	29	29	30	30	30	30	30	30	30	29	24	28	26	25	25	2								

IONOSPHERIC DATA STATION Yamagawa

DEC.2017 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1							B	B				A	A	A	A			B	B					
2							B	B	108	106	112		A	A	A	A	112	112			B			
3							B	B	112						A	A	A	A	A	B				
4							B	B	112	112	110	110	110		A	A			B	B				
5							B	B	108	108	108	108		A	A	108	112	110						
6							B	B	110	110	112			A	A	A		B						
7							B	B	108	108	108	108	108	108	108	108		A	A					
8							B	B	110	110	110	108		A	A	A	A	A	B	B				
9							B	A	108	108	106	106		A	A	A	A	A	A	B				
10							B	A							A	A	A		A	B				
11							B	B	112	112	112	108	108			A	A	A	A	B				
12							B	B	108	106			A	A	106		A	A	B	B				
13							B	B	110	110	110			A	A	A	A	A	B	B				
14							B	B	110	110	110	110					A		B					
15							B	B	110	110	110		A	A	A		110	108						
16							B	B	110	110	110				A	A		B	B					
17							B	B	108	108	108	108	108			108	108		A	B				
18							B	B	108	108	108	108	108	108	108	108		A	B	B	B			
19							B	B	110	110	110	110							B	B				
20							B		108	108	108	108	108	108	108	108		A	B	B				
21																								
22												A												B
23							B	B	116	116	116		116	114	114	114	114	114		B				
24							B	B	A						A		106	106	116					
25							B	B	112	112	110	110	110			116	116		A					
26							B	B	116	116	116	116	116	116		A	A	A	A	B				
27							B	B	108	108	110	110				110								
28							B	B	A	A			A	A	A	A	A	A	A	B				
29							B	B	118	118									B	B				
30							B	B	116	116	116	114	112	112	112	112	112		B	B				
31							B	A	112	112	112	112	110		A	A	A	A		B				
									110	110				110			110							
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									24	25	26	18	14	12	9	9	15	4						
MED									110	110	110	110	110	110	110	112	110	115						
U Q									112	112	112	110	110	111	111	113	112	117						
L Q									108	108	108	108	108	108	108	108	108	112						

DEC.2017 h'E (KM)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2017 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	B	90	98	96	96	94	94	B	134	G	126	102	102	102	102	G	G	B	92	90	90	88	88	B
2	B	B	88	88	88	B	88	88	124	104	102	102	102	102	96	96	90	90	90	90	90	B	90	B
3	B	B	B	B	B	B	B	B	G	146	130	124	124	106	100	100	100	94	94	94	92	86	B	96
4	B	B	B	B	B	96	94	B	G	G	144	126	102	126	126	G	130	B	B	106	120	B	B	B
5	92	B	B	92	94	94	146	120	126	126	126	106	104	102	102	100	130	B	B	B	B	116	116	B
6	B	100	B	B	100	B	B	B	120	G	124	G	G	G	156	98	94	92	92	92	92	B	B	B
7	B	B	B	B	B	B	B	B	154	154	140	112	108	136	96	94	94	90	90	90	90	90	90	92
8	86	96	96	B	96	92	90	B	142	120	108	158	92	92	92	92	92	92	118	92	92	92	92	92
9	100	100	92	92	92	92	92	92	92	92	94	94	94	94	94	94	94	94	94	92	92	92	90	B
10	B	B	B	90	B	90	90	96	132	G	114	114	114	102	102	102	94	94	90	B	B	92	92	92
11	92	90	90	90	B	B	B	B	G	116	100	94	94	G	94	94	94	86	86	84	B	B	B	100
12	B	B	100	B	B	B	B	B	136	126	126	120	98	96	96	100	100	98	98	98	98	98	94	96
13	96	100	100	92	92	92	90	90	G	118	114	114	96	94	94	94	122	B	80	80	80	96	96	B
14	B	92	92	B	B	92	B	92	G	G	G	118	118	134	134	90	146	88	B	B	94	100	100	
15	B	98	B	98	B	B	B	B	G	G	112	100	100	100	150	140	96	92	92	94	92	100	94	88
16	B	94	94	B	94	B	B	B	150	150	134	134	134	100	94	132	124	116	B	B	B	B	B	110
17	B	100	100	100	B	B	90	120	92	92	130	96	116	116	116	108	108	100	100	100	90	90	102	102
18	102	B	102	102	102	102	B	102	168	148	130	122	102	102	98	98	92	92	92	92	92	86	B	B
19	B	92	92	B	B	92	B	92	G	G	G	122	G	122	142	140	156	B	B	B	94	94	94	92
20	92	96	96	96	96	96	96	94	94	94	150	148	128	104	100	100	130	96	96	96	94	88	88	88
21																								
22	104	B	98	B	B	98	B	96	G	G	G	102	146	G	146	136	134	G	94	112	B	B	B	B
23	B	B	B	B	100	100	100	100	102	100	140	132	98	110	104	144	148	G	130	B	116	B	B	86
24	86	B	86	B	84	84	82	82	130	130	146	138	G	G	100	144	142	86	86	B	B	B	B	B
25	116	B	B	B	B	B	B	B	156	146	126	114	102	102	100	96	118	92	B	90	B	B	B	B
26	90	98	B	98	98	96	B	92	90	90	120	126	122	120	116	98	120	136	88	88	100	B	98	B
27	B	96	96	B	B	96	B	122	122	122	102	102	102	100	98	98	98	90	86	86	B	B	B	B
28	B	B	B	98	B	B	90	128	142	140	130	122	122	114	132	120	118	102	102	96	96	94	94	94
29	94	100	100	B	100	100	156	B	G	120	120	100	98	98	98	98	98	94	94	94	94	94	88	88
30	92	90	B	B	B	B	88	B	126	128	124	124	112	102	98	104	102	102	B	102	102	102	B	B
31	100	100	B	B	B	98	96	96	90	148	120	102	102	140	104	92	154	94	90	90	90	88	88	82
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	14	17	17	13	14	18	16	18	21	22	27	29	27	26	30	28	29	23	24	23	22	18	18	16
MED	93	96	96	96	96	95	91	96	126	124	124	114	102	102	100	99	108	94	92	92	92	92	93	92
U Q	100	100	100	98	100	98	96	120	142	146	130	125	118	116	116	114	130	98	95	96	96	98	96	96
L Q	92	92	92	91	92	92	90	92	98	104	114	102	98	100	98	95	94	90	90	90	90	88	90	88

DEC.2017 h'Es (KM)

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IONOSPHERIC DATA STATION Yamagawa

DEC.2017 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.31°12.0'N LON.130°37.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1		F2	F2	F1	F1	F1	F1			H2		C1	L1	L2	L2				L2	F2	F2	F2	F1		
2			F3	F3	F1		L1	L3	C2	L2	L2	L2	L2	L2	L2	L2	L3	L4	L6	F1	F2		F1		
3										H2	H2	C1	C2	L3	L3	L3	L2	L3	L1	F4	F4	F2		F1	
4						F1	L1				H2	C2	L2	CL22	CL22		CL22			F1	F1				
5	F1			F1	F2	F2	H2	C5	C3	C2	C2	L2	L2	L2	L3	L3	C1					F1	F1		
6		F2			F2					C2		C2			H2	L3	L2	L7	F3	F2	F1				
7									H3	H2	H3	C3	L2	H2	L4	L4	L5	L5	L9	L6	F4	F3	F4	F4	
8	F6	F3	F2		F1	F3	F2		H2	C2	C2	C2	L2	L3	L4	L4	L5	L4	F3	F7	F8	F5	F6	F3	
9	F3	F4	F6	F2	F2	F2	L3	L3	L4	L6	L2	L3	L5	L3	L2	L2	L3	L3	L3	F3	F2	F3	F1		
10				F2		F3	L2	L2	C2		C2	C2	C2	L2	L3	L2	L3	L4	L1			F1	F1	F4	
11	F8	F8	F7	F2						C3	L2	L3	L2		L3	L3	L2	L2	L1	F1				F1	
12			F2					C1	C2	C2	C2	L5	L4	L2	L3	L3	L6	L2	L2	F3	F4	F7	F2	F2	
13	F2	F1	F3	F3	F2	F2	F3	F2		C2	C2	C3	L2	L3	L2	LC22	LC22		L7	F2	F1		F1	F2	
14		F4	F1			F1		L2				C2	C2	HL22	HL22	L3	H2	L2			F2	F1	F1		
15		F1		F1								C2	L2	L2	L3	H4	L2	L4	L3	F1	F1	F1	F1	F2	
16		F1	F2		F1				H2	H2	H2	H1	HL22	L3	L4	HL21	C2	C3						F2	
17		F2	F2	F1			L2	L1	L3	L5	HL22	HL23	CL13	CL13	CL22	L2	L3	L6	L4	F5	F4	F3	F2	F2	
18	F1		F1	F2	F3	F3	L1	HL34	HL34	CL23	C3	L2	L6	L4	L3	L4	L4	L4	L3	F3	F1	F1			
19		F2	F2			F1		F1				C1		C1	HL11	HL22	H2		L1		F1	F1	F3	F2	
20	F2	F4	F2	F1	F2	F1	L3	L3	L3	L2	H2	H2	C2	L4	L4	L4	C2	L3	L2	F2	F3	F4	F2	F2	
21																									
22	L2		F2			F1		F2				L2	HL21		HL21	H2	C1		L3	F1					
23					F1	F1	L1	L2	L2	L2	H1	C2	L2	C1	L5	H2	H2		H1		F3			F2	
24	F2		F1		F5	F2	L3	L1	H2	HL22	HL12	HL12			L2	HL12	HL12	L6	L3						
25	F1								H2	H2	C2	C2	L4	L2	L3	L4	CL12	L3		L3					
26	F3	F3		F2	F3	F4		F7	L7	L4	C2	C1	C1	C2	C2	L4	C1	C2	L1	F1	F1		F1		
27		F1	F2			F1		C1	C2	C2	L2	L6	L3	L4	L8	L3	L2	L3	L6	F1					
28				F1			L2	C2	H2	H2	H2	C2	C1	C2	C2	C3	C4	L4	L4	F6	F3	F9	F3	F2	
29	F2	F1	F1		F2	F1	F1			C2	C2	L3	L2	L2	L3	L3	L9	L4	L4	F5	F7	F8	F3	F1	
30	F1	F1				L2		C2	C2	C2	C2	C3	L3	L3	L2	L2	L3	L2		F1	F1	F1			
31	F1	F2			F1	L7	L7	L3	H1	C2	L2	L2	L2	HL12	L4	L4	HL33	L3	L3	L2	F1	F1	F1	F1	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																									
MED																									
U Q																									
L Q																									

IONOSPHERIC DATA STATION Okinawa

DEC.2017 f_{XI} (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	X	34	37	39	39	42	A	A													X	X	X	X	X
2	X	35	36	40	46	34	28	26													A	40	37	36	33
3	X	33	34	37	41	44	47	30													X	X	X	X	X
4	X	31	31	32	34	36	25	22													X	X	X	X	X
5	X	29	30	32	42	25	19	23													X	X	X	X	X
6	X	47	34	33	56	49	40	38	49												X	X	X	X	X
7	X	29	33	34	34	46	26	19													X	X	X	A	X
8	X	33	38	43	58	32	29	26													X	X	X	X	X
9	X	32	33	33	32	31	32	32													X	X	X	X	X
10	X	31	31	34	36	33	38	34													X	X	X	X	X
11	X	31	32	35	31	31	30	28													X	X	X	X	X
12	X	36	34	39	37	32	34	32													X	X	X	X	X
13	X	32	35	36	34	34	30	30													X	X	X	X	X
14	X	33	35	36	36	35	33	31													X	X	X	X	X
15	X	33	33	34	34	33	35	36											62		X	X	X	X	X
16	X	32	32	34	34	38	35	32													X	X	X	X	X
17	X	38	42	46	44	42	37	31													X	X	X	X	X
18	X	32	36	43	30	35	29	26													X	X	X	X	X
19	X	28	31	33	34	33	36	23													X	X	X	X	X
20	X	33	34	34	32	32	37	20													X	X	X	X	X
21	X	31	31	30	31	31	37	28			C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C					X	X	X	X	X
23	X	31	30	30	30	34	39	27													X	X	X	X	X
24	X	33	36	37	32	33	41	40													X	X	X	X	X
25	X	38	44	41	36	43	34	30													X	X	X	X	X
26	X	29	30	31	32	34	34	32													X	X	X	X	X
27	X	34	35	33	33	35	33	31													X	X	X	X	X
28	X	30	32	34	36	47	34	27													X	X	X	X	X
29	X	28	34	31	30	32	32	28													X	X	X	X	X
30	X	33	39	32	34	44	28	26													X	X	X	X	X
31	X	32	33	37	39	45	39	27													X	X	X	X	X
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	30	30	30	30	29	29	1											1		29	30	30	29	30
MED	X	X	X	X	X	X	X	X													X	X	X	X	X
U Q	33	36	37	39	42	37	32														46	45	41	36	34
L Q	X	X	X	X	X	X	X														X	X	X	X	X
	31	32	33	32	32	30	26														36	36	32	31	30

IONOSPHERIC DATA STATION Okinawa

DEC.2017 foF2 (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1	28	F 29	F	F	F 34	A	A	V 36	50	63	60	63	59	V 65	77	65	70	H 65	47	34	33	30	32	27	
2	29	30	34	40	28	22	20	37	54	60	61	70	78	75	71	73	H 70	60	56	A	34	31	30	27	
3	27	28	31	35	38	41	24	38	48	60	60	62	67	56	62	62	62	H 56	38	27	28	28	26	26	
4	25	25	26	28	30	J 19	B 16	J 34	45	47	50	53	66	72	62	52	75	H 71	44	31	27	25	24	26	
5	23	24	26	36	J 19	B 13	J 17	B 29	42	48	67	80	96	81	78	62	100	64	48	38	56	55	H 38	32	
6	41	28	27	F 42	F 33	F 26	F 30	F 39	55	51	71	78	70	64	68	77	68	53	38	34	22	25	F 21	24	
7	23	27	28	J 40	R 20	J 13	B 32	J 48	H 58	H 62	H 70	62	69	V 66	V 55	V 63	V 55	V 41	V 33	V 34	R 28	A	26		
8	F 25	F	F 31	F 47	F 24	F 19	F 19	F 33	49	64	69	58	60	61	59	54	59	52	44	41	33	26	25	23	
9	26	27	27	26	25	26	26	37	50	60	62	55	V 58	J 60	R 72	J 67	R 56	J 56	R 41	J 36	R 36	J 39	R 30	28	
10	25	25	28	30	27	32	28	33	47	58	64	60	62	56	55	60	54	48	45	45	37	28	31	25	
11	25	26	29	25	25	24	22	33	57	60	56	A	53	57	56	70	59	52	53	44	35	27	33	28	
12	30	28	33	31	26	28	26	34	56	59	63	54	62	66	80	78	62	55	44	39	38	F 28	25	26	
13	26	29	30	28	28	24	24	33	44	54	77	66	63	74	71	64	69	64	42	28	26	26	26	25	
14	27	29	30	30	29	27	25	33	52	60	58	56	63	68	56	57	55	50	40	28	30	28	27	29	
15	27	27	28	28	27	29	30	34	48	56	62	59	V 62	V 86	J 87	R 89	V 80	J 55	R 48	J 33	R 31	J 26	R 30	28	
16	26	26	28	28	32	29	26	31	55	59	56	59	51	71	59	61	59	51	39	26	23	26	27	27	
17	F 28	F 28	F 37	F 28	F 32	F 29	F 24	F 28	44	52	57	56	57	57	62	60	64	A	42	33	39	39	V 36	25	
18	26	30	37	24	29	23	20	31	J 64	R 62	J 58	R 58	J 75	R 80	J 61	R 60	J 59	R 62	J 64	R 29	J 32	R 39	J 28	R 21	
19	22	25	27	28	27	31	18	28	57	59	64	72	80	U 88	R 88	U 97	R 82	U 61	R 56	U 35	R 34	U 30	R 28	28	
20	27	28	28	26	J 26	B 31	J 14	B 31	50	60	61	H 60	V 75	H 96	V 71	J 70	R 87	J 62	R 44	J 39	R 37	J 34	R 30	26	
21	25	25	24	25	F 25	F 30	F 20	F 29	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	60	54	54	44	27	26	28	26	22
23	25	24	24	24	F 25	F 30	22	29	46	54	60	47	52	62	64	63	66	62	48	46	41	31	26	26	
24	27	30	31	26	27	35	34	28	47	53	54	54	69	89	78	H 65	61	70	55	36	44	48	39	32	
25	32	38	35	30	37	28	24	32	57	59	68	70	66	72	67	64	A 61	A 64	V 74	J 52	R 41	J 35	R 24	24	
26	23	24	25	26	28	28	26	27	45	54	62	68	71	63	61	A	A	V 58	52	38	41	24	25	26	
27	28	29	27	27	29	27	F 23	F 29	56	60	54	58	64	84	88	64	55	64	44	37	34	30	24	22	
28	24	26	28	F 27	F 32	F 27	F	F	26	44	52	66	59	55	54	69	79	60	57	51	28	30	24	22	21
29	22	F 24	F 25	F 24	F 26	F 26	F 21	F 27	52	63	62	57	73	H 80	H 80	V 74	V 60	V 68	V 72	V 45	V 28	V 25	V 27	F 27	
30	F 25	F 27	26	27	F 38	F 22	F 20	F	54	58	56	62	62	64	62	74	61	58	38	38	44	43	29	F 22	
31	26	27	31	F 30	F 36	F 31	F 21	F	54	63	74	59	56	81	79	68	58	59	50	38	39	39	36	29	
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	30	29	29	29	30	29	28	30	30	29	29	28	29	29	29	29	29	29	30	29	30	30	29	30	
MED	26	27	28	28	28	27	22	32	50	59	62	59	63	69	68	64	61	58	44	36	34	28	27	26	
U Q	27	29	31	30	32	30	26	34	55	60	65	67	70	80	78	74	70	64	52	39	39	35	30	28	
L Q	25	25	26	26	26	24	20	28	47	54	58	56	58	62	62	60	59	54	42	30	30	26	25	24	

DEC.2017 foF2 (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2017 foF1 (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L	LU	L	L	L	L								
2										L	A	A	A	A	U	L								
3										L	L	L	A	L	L	L								
4									264	308	U	U	L	L	L	L								
5									A		L	L	L	L	L	L	U	L						
6										U	L	U	L	L	L	L	L							
7									252	L	L	L	U	L	A	L	U	L						
8									272	L	L	U	L	L	L	A	U	L						
9										L	L	U	L	U	A	A	L	L						
10										L	L	L	L	L	U	L	L	L						
11											L	A	L	A	L	L	L	L						
12										L	L	L	L	L	L	L	L							
13											L	L	L	L	U	L	L							
14									L		L	U	L	L	U	L	L							
15										L	L	L	L	L	L	U	L	L						
16								L		L	L	L	L	L	U	L	L	L						
17											L	L	L	L	L	L	L	L	A					
18										L	L	L	L	L	U	L	U	L	L	L				
19										L	L	L	L	L	L	L	L	L	L					
20									252		L	L	L	L	L	L	L	L						
21										C	C	C	C	C	C	C	C	C	C	C	C	C		
22									C	C	C	C	C	C	C	C	L							
23										L	U	L	L	U	L	L	L							
24										U	L	L	L	L	L	L	L	L						
25									L	L	L	U	L	A	A	L	L	L	L	L	L			
26								244		L	L	L	L	L	L	A	A	A	A	L				
27										L	U	L	L	A	L	A	L	A						
28										L	L	L	L	L	L	L	A	A						
29										U	L	L	L	L	L	A	L	L	L	L				
30										L	L	L	L	L	L	L	L	L	A					
31										L	L	L	L	L	L	L	L	L	L	L	L			
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									5	5	8	21	22	22	18	12								
MED									252	320	406	416	426	422	414	388								
U Q									U	L	L	L	L	L	L	L	L	L	L	L				
L Q									268	404	410	420	432	428	416	392								
									L	L	L	L	L	L	L	L	L	L	L	L	L			
									248	306	400	412	420	416	408	382								

DEC.2017 foF1 (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2017 f_oE (0.01MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B	232	276	312	316	336		A	A	A	A						
2								B	224	276	316		A	A	A	A	A	A	172					
3								B	224	268	292	304	320		A	A	A	A	A	A				
4								B	196	256	284	308	308	316		A	A	U	A	A	A			
5								A	A	256	312		A		A	A	A	A						B
6								B	208	264	296	296		A	A	A	A	A	A					B
7								B	192	252	284	296	304	300		A	A	A	A	A				
8								B	204	256	280	288	304		U	A	A	A	A	A	A			
9								B	A	272	288		A		A	A	A	A	A	A				
10								B	200	252		A	A		A									
11								B	240	272	304		A	A	A	A	A	A	A					B
12								B	196	244	284	300	300	300		A	A	A	A	A				
13								B	200	240		A	A	A	328		A	A	A	A				B
14								B	196		A	A	A	A	A									
15								B	A	268		A	A	A	A									
16								B	212	252		A	A		U	A								B
17								184	192	252	288	316	308	308	304	280								
18								B	224	256	284	304	300		A	A	A	A	A					B
19								B	192	252		A	300	308		A	A	288	A	A				B
20								B	204	268		A	A		A	A	A	A	A	A				
21								B		C	C	C	C	C	C	C	C	C	C	C				
22								C		C	C	C	C	C										B
23								B	188	256	284	304	312	304	296	288	252	184						B
24								B	196		A	A	A	A	A	A								B
25								B	188	276	280		A	U	A	U	A	A						B
26								B	A	248	276	320	320	308		A	A	A						B
27								B	A	252	288		A	A	A	A	A	A	A					
28								B	200	256	284	300	320	304	304	280	240	192						A
29								B	A	260	284		A	U	A	A	A	A						B
30								B	196	252	292		A	A	A	A	A							B
31								B	196	248	284	300	316	352		A								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	24	27	21	14	19	12	4	10	9	8						
MED								184	200	256	284	302	316	310	304	282	248	192						
U Q									214	268	294	308	320	322	306	288	250	196						
L Q									196	252	284	300	304	304	300	276	242	180						

DEC.2017 f_oE (0.01MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2017 foEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	J A	J A	J A	J A	J A	J A	J A	J A	G	G	40	50	48	49	79	53	46	19	30	30	22	21	20	20			
2	J A	18	19	18	E B	J A	16	20	20	G	G	46	80	80	102	64	90	63	38	26	67	88	39	22	19		
3	19	E B	E B	E B	E B	E B	E B	E B	G	30	35	40	45	42	50	42	27	47	28	31	22	19	16	16			
4	17	E B	E B	E B	E B	E B	E B	J A	E B	22	29	34	38	41	38	40	38	30	J A	J A	J A	J A	J A	J A	E B	16	
5	E B	E B	E B	E B	J A	17	19	18	20	29	32	40	61	48	70	50	42	45	20	24	18	18	16	18	16		
6	E B	J A	J A	J A	19	19	26	16	53	30	32	38	44	71	46	54	38	40	19	23	21	20	19	16	16		
7	E B	E B	E B	E B	E B	E B	E B	E B	G	30	33	32	35	48	49	38	38	50	33	33	40	38	52	24	24		
8	19	E B	J A	J A	J A	J A	J A	J A	G	30	34	35	63	60	127	76	30	47	30	33	30	28	21	20	20		
9	J A	J A	J A	J A	J A	J A	J A	J A	J A	30	35	38	44	54	135	53	45	53	52	32	26	20	21	19	19		
10	18	19	E B	J A	J A	J A	J A	J A	J A	30	110	41	54	29	36	34	28	21	26	16	16	16	16	16	17		
11	18	J A	J A	J A	E B	E B	E B	E B	G	35	36	70	63	66	37	39	33	21	18	20	20	22	J A	J A	J A		
12	E B	E B	E B	J A	J A	J A	J A	J A	G	24	33	37	38	39	37	38	36	J A	J A	J A	J A	J A	J A	J A	E B	16	
13	E B	E B	E B	E B	J A	J A	J A	J A	J A	24	28	39	41	52	43	79	32	30	20	16	20	26	20	18	17	17	
14	E B	J A	J A	J A	E B	E B	E B	E B	G	33	40	40	41	35	34	30	66	38	31	20	52	25	17	21	21		
15	J A	J A	J A	J A	J A	J A	E B	E B	J A	26	46	35	40	44	41	58	25	34	71	38	30	18	23	28	16		
16	20	J A	J A	J A	E B	E B	E B	E B	G	J A	J A	J A	J A	J A	J A	J A	G	J A	J A	J A	E B	E B	E B	E B	19		
17	E B	E B	J A	J A	J A	E B	E B	E B	G	31	37	35	37	36	34	32	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	
18	J A	J A	J A	J A	J A	J A	J A	J A	G	33	34	36	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	18	
19	E B	18	19	E B	E B	E B	E B	E B	G	J A	G	35	40	39	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	21	
20	J A	19	20	J A	J A	J A	E B	E B	G	G	32	35	35	51	40	62	44	52	86	32	22	19	21	30	30		
21	J A	E B	E B	E B	E B	E B	E B	J A	E B	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	33	33	G	J A	J A	J A	J A	J A	J A	18	
23	18	19	E B	E B	E B	E B	E B	E B	G	28	33	36	40	38	40	38	34	23	18	18	20	20	J A	J A	J A	18	
24	E B	J A	18	18	E B	J A	J A	J A	J A	J A	J A	33	36	34	34	52	31	30	22	J A	J A	E B	E B	E B	E B		
25	E B	E B	E B	E B	E B	19	21	16	18	G	J A	40	37	55	56	50	52	49	34	16	19	20	20	16	16		
26	E B	E B	E B	E B	J A	J A	J A	J A	J A	32	28	34	J A	J A	J A	J A	J A	J A	J A	E B	J A	E B	J A	E B	J A	26	
27	E B	E B	E B	E B	J A	J A	J A	J A	J A	25	31	32	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	E B	E B	E B
28	E B	E B	E B	E B	E B	19	18	E B	E B	24	30	33	36	39	40	40	38	J A	38	27	J A	J A	J A	J A	J A	J A	49
29	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	44	31	40	39	38	49	51	44	25	19	32	28	18	14	18	18	
30	E B	17	E B	E B	J A	E B	J A	J A	G	G	31	34	J A	J A	J A	J A	J A	J A	G	E B	J A	E B	J A	E B	J A	20	
31	J A	J A	J A	J A	J A	E B	E B	E B	G	G	33	34	53	40	35	G	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	20
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	30	30	30	30	30	30	30	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	30	30	30		
MED	17	18	16	18	19	16	18	16	22	30	34	38	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	18	
U Q	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A	J A
L Q	E B	E B	E B	E B	E B	E B	E B	E B	G	G	28	33	36	38	38	38	33	33	21	19	18	18	18	16	16	16	

IONOSPHERIC DATA STATION Okinawa

DEC.2017 fbEs (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	E 16	E 16	E 16	E 16	E 16	E 24	E 32	E 16	G	G	36	38	25	38	36	30	33	19	20	23	E 16	E 16	E 16	E 16
2	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	40	41	42	44	35	36	34	21	23	A 67	E 21	E 17	E 18	E 16
3	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	30	34	38	42	35	33	28	25	21	23	18	E 16	E 16	E 16	E 16
4	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	29	34	37	40	38	32	30	30	20	16	E 16	E 18	E 16	E 16	E 16
5	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 19	27	30	38	38	37	38	34	30	27	16	16	16	E 16	E 16	E 16	E 16
6	E 16	E 16	E 16	E 28	E 16	E 16	E 16	E 16	46	30	32	36	34	33	30	30	25	18	16	16	E 16	E 16	E 16	E 16
7	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	21	29	33	31	33	43	39	29	28	24	22	20	22	23	A 52	E 16
8	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	30	33	34	35	39	39	36	29	30	21	24	20	21	E 18	E 16
9	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	32	32	35	44	43	32	29	34	26	16	E 16	E 16	E 16	E 16
10	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	16	29	32	33	33	26	32	34	28	20	18	E 16	E 16	E 16	E 16
11	E 16	E 16	E 20	E 16	E 15	E 16	E 16	E 16	G	30	34	A 70	40	48	36	36	28	21	16	16	E 16	E 16	E 16	E 16
12	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	32	35	36	36	35	38	34	28	22	26	29	21	17	E 16	E 16
13	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	23	28	31	36	36	34	38	32	29	20	16	16	E 16	E 16	E 16	E 16
14	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	31	32	35	34	32	30	21	29	21	18	16	E 16	E 20	E 16	E 16
15	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	23	16	34	36	38	36	32	22	19	25	18	20	E 16	E 16	E 19	E 16
16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	17	18	29	33	23	35	G	30	17	G	E 20	E 16	E 16	E 16
17	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 19	27	31	36	35	36	35	32	32	28	A 55	A 27	E 16	E 16	E 16	E 16	E 16
18	E 16	E 21	E 16	E 16	E 16	E 16	E 16	E 16	E 16	29	31	33	G	34	32	31	25	21	14	16	E 16	E 16	E 16	E 16
19	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	29	G	34	32	37	G	27	24	E 16	E 20	E 16	E 21	E 16	E 16
20	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	30	34	35	35	33	31	27	23	35	16	E 16	E 16	E 16	E 16
21	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	G	33	18	G	E 16	E 16	E 16	E 16
23	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	28	32	35	38	38	39	38	33	23	16	16	E 16	E 16	E 16	E 16
24	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	25	27	30	35	34	33	35	29	30	21	16	16	E 17	E 16	E 16	E 16
25	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	20	35	38	48	42	37	31	17	G	E 16	E 16	E 16	E 16	E 16
26	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	18	28	34	34	36	37	43	A 78	A 83	A 15	A 16	E 16	E 16	E 16	E 16	E 16
27	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	28	30	34	53	36	46	30	40	20	22	20	E 16	E 16	E 16	E 16
28	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	32	36	38	38	39	36	33	26	24	18	E 24	E 16	E 16	E 16
29	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	27	30	40	38	38	46	32	30	21	16	16	E 16	E 16	E 14	E 16
30	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	22	G	30	33	37	38	38	30	32	G	E 16	E 16	E 16	E 16	E 16	E 16
31	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	32	33	33	37	34	G	25	30	33	16	E 21	E 18	E 22	E 20
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	30	30
MED	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	28	32	35	36	37	36	31	28	21	17	16	E 16	E 16	E 16	E 16
U Q	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	24	30	34	38	38	38	39	34	30	24	23	20	17	16	E 16	E 16
L Q	E 16	E 16	E 16	E 16	E 16	E 16	E 16	E 16	G	G	30	33	34	34	32	30	25	20	16	16	E 16	E 16	E 16	E 16

DEC.2017 fbEs (0.1MHz)

IONOSPHERIC DATA STATION Okinawa

DEC.2017 fmin (0.1MHz) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

$\frac{H}{D}$	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	16	16	16	16	16	16	16	16	16	16	17	19	19	14	14	15	16	16	14	16	16	16	16	16
2	16	16	16	16	16	16	16	16	14	14	16	14	17	15	14	14	14	15	16	16	16	16	16	16
3	16	16	16	16	16	16	16	16	14	14	14	18	15	14	15	15	14	14	14	16	16	16	16	16
4	16	16	16	16	16	16	16	16	16	16	14	14	14	16	15	15	15	14	14	16	16	16	16	16
5	16	16	16	16	16	16	16	16	14	11	15	14	16	16	16	13	12	12	16	16	16	16	16	16
6	16	16	16	16	16	16	16	16	15	14	15	14	14	14	14	14	14	15	16	16	16	16	16	16
7	16	16	16	16	16	16	16	16	14	16	14	15	15	17	15	14	14	14	16	16	16	16	16	16
8	16	16	16	16	16	16	16	16	16	14	12	15	15	14	14	14	12	15	16	14	14	14	16	16
9	16	16	16	16	16	16	16	16	16	15	14	14	15	15	15	13	14	14	14	16	16	16	16	16
10	16	16	16	16	16	16	16	16	14	15	13	14	14	14	14	13	15	15	16	16	16	16	16	16
11	16	16	16	16	15	16	16	16	16	16	15	15	15	15	13	16	14	14	16	16	16	16	16	16
12	16	16	16	16	16	16	16	16	16	15	13	14	15	14	15	16	14	14	14	16	14	16	16	16
13	16	16	16	16	16	16	16	16	16	14	15	15	14	15	14	14	14	16	16	16	16	16	16	16
14	16	16	16	16	16	16	16	16	16	16	14	14	14	15	14	15	15	14	14	16	16	16	16	16
15	16	16	16	16	16	16	16	16	16	16	16	18	18	15	15	14	14	16	16	16	16	16	14	16
16	16	16	16	16	16	16	16	16	14	14	12	14	13	14	14	14	14	14	16	16	16	16	16	16
17	16	16	16	16	16	16	16	16	16	14	14	16	17	15	14	14	14	15	15	16	16	16	16	16
18	16	16	16	16	16	16	16	16	16	15	14	14	14	14	14	16	14	14	14	16	16	16	16	16
19	16	16	16	16	16	16	16	16	14	14	12	14	14	14	13	14	10	14	16	16	16	16	16	16
20	16	16	16	16	16	16	16	16	16	14	14	15	15	17	16	17	15	16	16	16	16	16	16	16
21	16	16	16	16	16	16	16	16	15	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	14	14	12	16	16	16	16	16	16
23	16	16	16	16	16	16	16	16	16	16	15	18	18	15	14	17	14	15	16	16	16	16	16	16
24	16	16	16	16	16	16	16	16	15	12	14	16	14	16	14	14	16	14	16	16	17	16	16	16
25	16	16	16	16	16	16	16	16	16	15	15	15	15	17	14	15	15	15	16	16	16	16	16	16
26	16	16	16	16	16	16	16	16	16	14	14	16	14	15	15	14	12	15	16	16	16	16	16	16
27	16	16	16	16	16	16	16	16	16	16	14	14	16	16	16	16	14	16	16	16	16	16	16	16
28	16	16	16	16	16	16	16	16	16	16	15	14	15	18	16	10	16	16	16	16	16	16	16	16
29	16	16	16	16	16	16	16	16	16	14	14	14	15	15	14	14	16	16	16	16	16	16	14	16
30	16	16	16	16	16	16	16	16	16	15	14	14	14	14	14	14	15	15	16	16	16	16	16	16
31	16	16	16	16	16	16	16	16	16	16	16	15	14	14	14	14	15	14	16	16	16	16	16	16
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT	30	30	30	30	30	30	30	30	30	29	29	29	29	29	29	30	30	30	30	30	30	30	30	30
MED	16	16	16	16	16	16	16	16	16	15	14	14	15	15	14	14	14	15	16	16	16	16	16	16
U Q	16	16	16	16	16	16	16	16	16	16	15	16	16	16	15	15	15	15	16	16	16	16	16	16
L Q	16	16	16	16	16	16	16	16	15	14	14	14	14	14	14	14	14	14	15	16	16	16	16	16

DEC.2017 fmin (0.1MHz)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2017 M(3000)F2 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
1		330	302 ^F	^F	^F	360 ^F	^A	^A	^V						^V											
2		307	315	341	362	402	334	319	364	375	367	341	370	363	365	334	366	348 ^H	357	374	^A		329	345	364	343
3		327	318	321	331	336	415	331	362	340	372	403	381	383	383	377	373	376	388	391	372	320	355	348	343	
4		345	334	349	383	417	384	^B		375	387	376	362	357	349	357	382	340	361	332 ^H	377	362	336	354	338	367
5		310	287	314	407	408	^B		332	381	385	328	343	347	358	346	382	318	378	355	347	322	294	345	317 ^H	300
6		338	280	290	352 ^F	322 ^F	339 ^F	332 ^F	348 ^F	358	349	359	384	379	367	359	377	397	403	370	351	378	350	309 ^F	305	
7		285	296	323	313 ^{J R}	372	390	578 ^B	342	363	380	364 ^H	376	338	362	359 ^V	329	374	389	364	325	322 ^R	341	^A	300	
8		322 ^F	^F	324 ^F	366 ^F	382 ^F	353 ^F	334 ^F	357 ^F	362	365	368	379	362	373	375	362	369	403	367	392	389	309 ^{J R}	361	298	
9		305	323	317	304	321	360	351	370	411	389	372	353 ^V	383	318 ^{J R}	364	352	372	389	369	375	332	323 ^{J R}	361	378	
10		285	313	319	341	318	353	380	385	363	369	402	381 ^A	384	405	372	370	376	395	384	390	372	341	360	366	
11		317	311	338	345	310	322	310	370	388	401	381		371	365	329	366	393	399	362	391	335	312 ^F	335	313	
12		347	354	333	352	314	306	357	344	371	375	391	386	365	362	374	368	380	373	361	341	349	351	320	324	
13		302	313	323	357	351	309	313	385	403	349	367	378	376	356	355	362	373	404	370	366	343	348	327	329	
14		309	323	327	339	323	319	320	347	372	386	388	373	363	382	371	374	380	361	400	373	348	317	356	360	
15		348	314	334	311	306	335	364	383	371	346	366	371 ^V	330 ^V	352 ^{J R}	313 ^V	299 ^{J R}	375	375 ^F	365	389	346	310	355	342	
16		317	314	340	316 ^F	322 ^F	379 ^F	372 ^F	356 ^F	371	384	387	368	369	369	343	351	392	395	408	384	362	301	352	338	
17		308 ^F	303 ^F	345 ^F	317 ^F	327 ^F	377 ^F	393 ^F	360 ^F	382	364 ^{J R}	373	382	359	375	362	370	394	^A	365	361	303	339 ^V	399	308	
18		295	333	369	304	365	383	293	331	347	371 ^{J R}	375	356	344	357	349	351	385	358	400	378	337	343	378	258	
19		288	305	317	355	317	377	^B		346	365	361	351	339	339 ^{U R}	319	297	329	366	367	368	294	335	340	307	338
20		313	326	348	329	336	395	^B		342	386	380	374	324 ^H	331 ^V	368 ^H	347 ^{V J R}	314	369	389	372	377	345	354	373	337
21		329	321	314	316 ^F	290 ^F	368 ^F	303 ^F	341	381	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C
22			^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	^C	376	384	369	429	342	353	359	366	354	
23		328	321	297	302	325 ^F	405 ^F	351	356	379	363	380	392	329	363	369	358	367	380	340	341	386	360	357	303	
24		322	341	368	345	304	365	400	355	356	365	351	361	336	350	354	339	344	370	385	287	317	351	342	322	
25		302	320	374	316	367	409	303	336	355	377	358	350	356	380	356	365	376	325 ^H	375 ^{J R}	310	343	386	322	329	
26		359	320	330	305	324	348	375	361	381	357	364	371	361	369	364	^A	^A	359 ^V	340	351	343	399	322	315	
27		318	340	321	318	335	364	343 ^F	335	378	367	379	348	338	354	385	381	359	399	338	348	327	354	362	350	
28		313	318	343	331 ^F	365 ^F	365 ^F	^F		385	352	349	364	375	355	362	347	387	384	389	394	323	379	328	338	314
29		302	313 ^F	360	321	342	383	300	325	360	369	357	352	364	369 ^H	365	353	351	329	366	387	360	329	332	307 ^F	
30		312 ^F	308 ^F	318	355 ^F	375 ^F	321 ^F	315	330	370	394	387	356	361	367	363	391	353	413	353	341	322	347	360	310 ^F	
31		311	329	300	321 ^F	348 ^F	350 ^F	391	331	362	349	377	393	325	374	392	362	377	393	382	323	319	355	355	333	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT		30	29	29	29	30	28	25	30	30	29	29	28	29	29	29	29	29	29	30	29	30	30	29	30	
MED		313	318	327	331	336	364	334	356	371	369	368	371	359	365	362	362	375	388	370	351	340	345	355	326	
U Q		328	324	344	354	365	383	374	370	381	378	380	381	367	371	373	372	382	395	384	378	353	354	362	343	
L Q		305	310	318	316	321	337	314	342	362	359	360	354	338	355	348	346	366	360	362	332	327	328	330	307	

DEC.2017 M(3000)F2 (0.01)

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IONOSPHERIC DATA STATION Okinawa

DEC.2017 M(3000)F1 (0.01) 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										L	L	LU	L	L	L	L								
2										L	A	A	A	A	U	L								
3										L	L	L	A	L	L	L								
4									449	480	U	L	U	L	L	L								
5									A		A	A		L	L	U	L							
6									U	L	U	L	L	L	L	L								
7									L	L	L	U	L	A	L	U	L							
8									462	L	L	U	L	L	A	U	L							
9									430	L	L	U	L	A	A	L	L							
10									L	L	L	L	L	U	L	L	L							
11									L	A	L	A	L	A	L	L	L							
12									L	L	L	L	427	415	L	L								
13									L	L	L	L	418	433	U	L	L							
14									L	L	U	L	L	U	L	L	L							
15									L	L	L	410	413	367	L	U	L							
16								L	L	L	L	407	422	409	404	428	L							
17									L	L	L	401	397	399	382	L	L			A				
18									L	L	L	L	L	U	L	L	L			L				
19									L	L	L	403	392	406	L	L	L							
20									L	L	L	L	L	L	L	L	L							
21									459	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22									C	C	C	C	C	C	C	C	L							
23									L	U	L	L	U	L	L	L	L							
24									451	L	L	L	L	L	L	L	L							
25									465	L	L	U	L	A	A	L	L	L	L	L	L	L	L	L
26									L	L	L	U	L	A	A	L	L	L	L	L	L	L	L	L
27									453	391	388	L	L	A	L	A	L	A	A	L	L	L	L	L
28									L	U	L	L	A	L	A	L	A	L	A	L	L	L	L	L
29									L	U	L	L	U	L	U	L	L	L	L	L	L	L	L	L
30									U	L	L	L	404	L	A	L	L	L	L	L	L	L	L	L
31									L	L	L	L	403	382	386	397	385	L	L	L	L	L	L	L
									L	L	L	L	437	390	402	408	L	L	L	L	L	L	L	L
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT									5	5	7	21	22	22	17	12								
MED									453	451	391	403	404	396	398	402								
U Q									460	472	415	406	418	409	410	418								
L Q									U	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
									440	383	384	398	384	383	390	386								

DEC.2017 M(3000)F1 (0.01)

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DEC.2017 h'F2 (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1										230	214	228	244	262	240	236								
2										222	236	240	240	234	256									
3										220	214	224	236	234	238	234								
4									202	212	250	262	246	234	222									
5									208		266	248	248	232	222	302								
6										274	242	222	216	246	248									
7									218	222	228	236	262	248	234	240								
8									206	236	226	226	252	240	230	246								
9										220	210	250	228	240	A 236	O 236	224							
10										230	218	230	228	212	236	242	214							
11										210	A 210	242	244	296	L 234	216								
12										226	220	226	252	240	230	236								
13											238	226	226	250	252	224								
14									210		218	250	254	224	226	236								
15										234	242	240	266	238	226	246								
16								230		224	232	236	238	244	254	258								
17											224	240	238	246	236			A						
18										226	228	246	264	234	234	226	222							
19										L 236	236	244	248	224		238								
20									200		216	266	268	220	252	258								
21										C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22									C	C	C	C	C	C	C	226								
23										204	228	232		L 302	244	242								
24										222	262	244	268	246	232	230								
25										212	216	250	246	248	224	242	230	230	206					
26										218		246	232	234	230	250	A	A	206					
27											226	252	274	244	218	218	246							
28											250	218	250	238	262	228								
29											242	222		238	226	244	220	226						
30											214	222	262	246	244	248	216	244						
31											236	218	228	302	228	202	222	224						
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	9	20	28	26	29	29	28	25	9	2						
MED								230	208	226	228	238	248	238	239	236	224	206						
U Q									215	235	242	248	263	244	249	241	237							
L Q									203	221	218	226	238	229	230	226	219							

DEC.2017 h'F2 (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC. 2017 h'F (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT. 26°41.0'N LON. 128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
1	260	302	302	232	208		A	A	216	208	206	A	E	A	A	A	210	230	198	190	226	A	216	250	210	284	
2	282	276	236	210	188	236	274	220	206	188		A	A	A	A	212	236	212	196	192	A	234	210	226	216		
3	266	272	258	230	222	176	228	210	192	198	202		A	A	204	188	194	208	200	192	204	250	216	222	228		
4	232	250	232	214	180	208		B	208	178	162	192	222		A	226	200	198	238	186	186	182	234	220	246	222	
5	292	310	270	186	186		B	B	314	204	A	226		A	E	A	A	216	210	222	192	184	212	222	202	198	276
6	212	316	312	224	222	242	254	218	234	202	220	204	202	192	174	224	208	192	190	186	194	238	278	258	Q		
7	310	310	272	270	212	178		B	222	168	216	224	196	192		A	A	180	222	198	200	216	272	266	A	252	
8	276	300	240	196	202	246	302	212	182	216	216	200	196		A	A	220	232	196	204	190	194	300	218	278		
9	280	260	254	304	282	234	218	196	200	204	196	180	192		A	A	206	202	206	202	180	216	202	204	198		
10	302	296	278	224	272	222	196	198	210	216	206	202	210	192	172	232	194	196	198	182	194	226	218	206			
11	268	302	254	228	272	266	272	202	212	212	202		A	A	A	212		206	192	210	176	178	250	240	238		
12	234	220	232	210	262	278	200	226	222	216	220	200	194	184		A	A	230	216	202	198	242	218	216	248	248	
13	270	266	246	210	238	274	262	190	206	226	216	200	194	170	226	218	226	200	182	188	192	206	222	238			
14	282	248	258	236	252	250	262	226	194	220	212	212	188	172	180	176	224	214	192	198	214	274	210	222			
15	216	244	252	256	286	246	208	200	198	186	228	196	212	234	176	160	210	198	188	186	232	252	230	230			
16	266	292	252	274	244	204	194		B	208	190	190	186	200	196	180	170	200	200	174	170	226	254	210	226		
17	258	270	208	206	250	184	178	234	200	224	234	212	202	210	192	206	208		A	214	178	248	208	192	262		
18	284	258	210	286	208	194	308	236	234	222	220	214	194	202	182	218	196	230	186	170	216	202	204	380			
19	338	304	280	226	272	208	180	234	222	186	184	176	200	190	230	208	204	218	188	216	218	244	268	222			
20	258	258	220	252	254	192		B	204	176	216	188	186	208	214	192	198	214	200	220	198	216	204	208	222		
21	246	266	276	270	284	210	264	226	210		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
22		C	C	C	C	C	C	C	C	C	C	C	C	C	C		220	206	206	174	184	240	214	206	224		
23	250	286	292	278	256	188	222	208	192	188	218	194	222	226	220	242	222	196	186	184	184	198	202	284			
24	260	238	204	212	282	214	178	166	216	162	184	198	204	184	188	160	200	222	178	170	236	208	212	252			
25	280	242	206	266	216	178	274	236	196	208	228	228		A	A	210	212	206	198	190	170	214	206	230	236		
26	230	266	254	304	240	208	200	230	162	214	222	214	222	212		A	A	A	176	184	192	208	176	242	252		
27	278	236	246	250	240	214	220	216	212	212	210	208		A	208		206		A	196	194	202	204	212	210	222	
28	264	272	254	282	226	214	218	190	198	218	202	208	212	204		A	A	218	202	198	210	226	250	234	276		
29	304	298	228	268	236	200	306	242	204	192	186	240	218		A	A	194	192	202	190	186	204	220	228	248		
30	256	278	252	230	206	264	292	238	216	202	198	192	216	224	E	A	190		A	190	176	216	220	192	210	264	
31	268	254	252	264	214	206	198	226	238	178	194	186	162	226	A	196	182	210	202	212	228	220	212	228	236		
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23			
CNT	30	30	30	30	30	28	26	29	29	29	26	25	24	21	21	27	27	29	30	29	30	30	29	30			
MED	267	271	252	234	239	212	223	216	206	208	208	200	202	204	194	206	210	198	190	188	217	212	218	238			
U Q	282	298	270	270	262	244	274	228	214	216	220	213	214	222	218	220	222	202	198	211	232	250	232	262			
L Q	256	254	232	214	212	197	200	203	193	189	194	193	194	191	181	190	204	196	186	181	204	206	209	222			

DEC. 2017 h'F (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2017 h'E (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

H D	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1								B						A	A	A	A							
2								B	106	106	106	104	108					112						
3								B						A	A	A	A	A	A					
4								B	106	104	102	102	106			A	A		A	A				
5								A	102	102	102	102	100	100			100							
6								B	A			A		A	A	A	A			B				
7								B	108	106			104											
8								B	106	104	104	104				A	A	A	A	A				
9								B	102	102	102	102	102	102										
10								B	102	102	102	102	100		A	A	A	A	A	A				
11								B	A			A		A	A	A	A	A	A	A				
12								B	108	104			110	106			108	108						
13								B	104	102	100			A	A	A	A	A	A	B				
14								B	104	102	102	102	102	100		A	A		A	A				
15								B	110	104				100					A	B				
16								B	104		A	A	A	A	A				A	A				
17								B	104	A	A	A	A	A					A	A				
18								B	106	106						106	106							
19								B	122	112			112		102	106	110		A	B				
20								B	166	102	104	102	102	102	100	100		A	A	A				
21								B	114	102	106	110	102		A	A		A	A	B				
22								B	106	102		102	102		A	A	104		A	A				
23								B	104	102		A	A		A	A	A	A	A	A				
24								B	104	102		102												
25								B	118		C	C	C	C	C	C	C	C	C	C				
26								C	C	C	C	C	C	C	C						B			
27								B	104	104	104	104	108	104	104	110	104	108						
28								B	122		A	A	A	A	A		104		A	B				
29								B	108	106	106		104	104		A	A							
30								B	A						A	A	A							
31								B	102	100	106	104	102					110		B				
								B	110	106	106	104	106	104	103	108	107	112						
								B	110	100	100		A	A	A	A		104	A					
								B	110	100	100				A		A	A						
								B	104	104	102	100	100	100		100								
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT								1	24	27	21	14	19	11	4	10	9	8						
MED								166	106	104	102	102	102	102	101	105	104	110						
U Q									110	106	106	104	106	104	103	108	107	112						
L Q									104	102	101	102	102	100	100	100	104	106						

DEC.2017 h'E (KM)

IONOSPHERIC DATA STATION Okinawa

DEC.2017 h'Es (KM)

135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D \ H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	102	116	98	88	92	92	88	84	G	G	110	110	98	98	98	96	92	154	90	86	86	88	86	84
2	100	88	86	90	B	90	90	78	G	G	104	104	98	94	94	88	92	96	120	110	128	96	84	84
3	94	B	B	B	B	B	B	90	G		158	126	108	108	108	92	92	92	90	86	84	86	86	B
4	96	B	B	B	B	B	84	B	B		132	156	148	130	120	122	104	96	144	90	90	88	84	88
5	B	B	B	B	92	158	90	130	138	140	120	82	108	108	98	94	92	92	86	86	82	B	108	B
6	B	120	120	110	98	88	108	78	104	176	116	102	106	102	112	96	90	90	90	90	86	84	84	B
7	B	B	B	B	B	B	B	B	126	158	138	130	110	100	98	92	98	94	90	90	88	86	86	96
8	94	B	112	110	114	94	94	90	G		140	140	146	98	98	106	92	154	92	88	84	84	80	100
9	94	108	94	116	88	102	90	88	104	162	124	104	106	102	98	106	92	88	88	88	B	84	86	84
10	96	80	B	90	94	94	104	92	88	158	98	98	106	86	100	150	164	130	88	B	B	B	B	106
11	94	94	96	96	B	B	B	B	G		140	114	102	102	96	162	90	90	144	84	84	82	122	116
12	B	B	B	94	90	90	104	92	136	128	118	114	110	108	98	94	92	92	92	B	90	90	82	86
13	B	B	B	100	96	90	90	90	150	150	106	106	104	100	92	148	90	158		80	102	106	106	104
14	B	98	98	94	B	B	90	86	G		176	110	128	112	100	96	90	88	88	86	84	108	100	96
15	88	80	94	92	94	94	B	B	90	110	88	108	102	102	98	104	92	90	90	86	86	86	92	88
16	88	94	94	94	92	B	B	B	100	98	98	96	152	92	G	142	86	110	86	86	B	86	B	96
17	B	B	94	94	90	B	B	172	150	146	140	156	136	130	132	112	100	98	98	94	88	86	90	100
18	86	100	98	104	98	136	98	98	98	132	130	116	G	98	98	100	96	92	88	88	84	84	B	122
19	B	100	96	B	104	B	B	B	G	G	100	G		146	104	152	92	92	120	88	108	82	96	82
20	88	92	98	98	102	B	B	B	G	G	104	150	158	102	102	100	94	92	86	86	86	82	88	86
21	82	B	B	B	B	B	102	B	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
22	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	164	88	G	82	82	80	116	106
23	104	100	B	B	98	B	102	B	G		148	174	122	126	126	114	164	158	140	86	126	112	112	86
24	B	100	88	98	B	90	90	90	152	150	96	160	138	112	86	100	156	160	82	86	B	112	B	B
25	B	B	B	B	90	88	B	B	G		96	118	108	102	100	96	100	98	G	B	84	134	82	B
26	B	B	B	108	96	92	B	B	90	158	144	88	126	120	98	86	86	86	94	B	122	106	B	88
27	B	B	B	B	96	90	90	94	112	112	124	102	96	100	92	90	110	108	84	84	80	80	B	B
28	B	B	B	B	90	96	B	B	84	178	156	148	134	128	118	142	114	104	124	104	100	100	100	98
29	98	92	94	94	90	90	88	B	104	108	112	188	158	132	108	104	96	96	148	88	88	106	B	112
30	B	100	B	B	98	B	90	90	166	G	160	146	104	104	104	104	96	G	B	94	110	B	86	90
31	94	94	94	94	90	B	B	B	G	G	148	108	108	138	90	G	92	130	108	92	86	84	80	78
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CNT	16	17	16	19	22	17	18	19	19	23	29	28	28	29	28	29	30	27	27	28	27	27	21	21
MED	94	98	95	94	94	92	90	90	112	148	118	109	108	102	98	96	92	96	88	87	86	86	86	96
U Q	97	100	98	104	98	95	102	92	150	158	140	132	127	115	107	109	100	130	92	91	102	106	97	103
L Q	88	92	94	94	90	90	90	86	100	128	107	102	103	98	96	92	90	90	86	84	84	84	84	85

DEC.2017 h'Es (KM)

NATIONAL INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY, JAPAN

IONOSPHERIC DATA STATION Okinawa

DEC.2017 TYPES OF Es 135°E MEAN TIME (G.M.T. + 9 H)

LAT.26°41.0'N LON.128°09.0'E SWEEP 1.0MHz TO 30.0MHz IN 15.0SEC IN MANUAL SCALING

D	H	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	F	F	F	F	F	F	F	L			C	C	L	LQ	LQ	LQ	LQ	HL	L	L	FQ	FQ	F	F	
2	F	F	F	F		F	F	L			C	C	LQ	LQ	LQ	LQ	LQ	CL	CL	FFQ	FFQ	F	F	F	
3	F							L		H	C	C	C	CL	L	LQ	LQ	L	L	F	F	F			
4	F						F		H	H	H	H	C	C	CHQ	LQ	H	LH	LQ	FQ	FQ	F	F	FQ	
5					F	FF	F	H	HCL	HLL	C	LC	C	C	L	LH	LQ	L	L	F	F	F	F	F	
6		F	F	F	F	F	FF	L	C	HC	C	C	CQ	LQ	CQ	LQ	LQ	LQ	L	F	F	F	F	F	
7								C	H	H	H	C	C	C	L	L	L	L	F	FQ	FQ	FQ	FQ	FQ	
8	F		FFQ	FFQ	FQ	FQ	FQ	L	H	H	HC	C	C	CLQ	L	HL	L	L	F	F	F	F	F	FQ	
9	F	F	F	FF	F	FF	F	L	CH	H	C	C	CH	CQ	LQ	CHQ	LQ	LQ	LQ	FQ	FQ	FQ	FQ	F	
10	F	F		F	F	F	L	L	H	H	LH	LQ	CQ	L	C	HL	HL	HL	L					F	
11	F	F	F	F					H	C	C	C	L	HL	L	L	HL	L	F	FF	F	F	F	F	
12				F	F	F	F	L	H	C	C	C	CL	C	L	L	L	L	F	F	F	F	F		
13				F	F	F	F	L	H	HC	CH	C	C	LC	HL	LH	HC			FF	FF	FF	FF	F	
14		F	F	F			F	L	HCO	CHQ	CQ	CQ	CQ	CQ	LQ	L	LQ	LQ	LQ	FF	FF	FQ	F	F	
15	F	F	F	FQ	F	F		L	C	L	C	C	C	LQ	CLQ	L	LH	LQ	LQ	FQ	FQ	F	F	F	
16	F	FQ	F	F	F			L	L	LQ	LQ	HLQ	LCQ			HL	LC	CL	LL	F		F		F	
17			F	F	F		HL	H	H	H	H	H	H	H	H	C	L	L	L	F	F	F	F	FF	
18	FF	F	F	F	F	FF	F	L	L	H	H	C		L	L	LQ	LQ	LQ	L	F	F	F	F	F	
19		F	F	F							L		H	C	HL	LH	LH	CLQ	LQ	FF	F	F	F	F	
20	F	F	F	F	F						C	H	H	C	CQ	LQ	LH	L	Q	FQ	F	F	F	F	
21	F					F		L																	
22																HL	LH		L	F	F	FF	FF	F	
23	F	F			F		F		H	HL	CL	CL	CL	C	CL	HL	H	H	L	F	F	F	FQ	F	
24		F	F	F		F	F	L	HL	HC	L	HL	HL	CL	LC	C	HL	HL	LQ	F		F			
25					F	F		L	LQ	CQ	CQ	CQ	CQ	CQ	LQ	LHQ				F	F	F			
26				F	F	F		H	LC	H	H	LH	C	C	L	L	L	L		F	F		F	F	
27				F	F	F	L	C	C	C	C	C	LQ	L	LQ	LQ	CLQ	CL	LQ	FQ	F	F			
28				F	F		L	H	HC	H	H	C	C	C	H	C	C	C	L	F	FQ	FQ	FQ	FQ	
29	FQ	FQ	F	F	F	F		C	C	C	HC	HC	HC	CL	CQ	LQ	L	H	F	F	F	F	F	F	
30		F			F	F	L	HL		H	HC	CQ	CQ	CQ	CQ	LQ	LQ		FQ	F		F	F	F	
31	F	FQ	FQ	FQ	F					H	C	C	H	LQ		LHQ	HLQ	CLQ	FQ	F	F	F	F	F	
		00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
CNT																									
MED																									
U Q																									
L Q																									

f - PLOTS OF IONOSPHERIC DATA

KEY OF f - PLOT	
	SPREAD
◊	f _o F ₂ , f _o F ₁ , f _o E
×	f _x F ₂
*	DOUBTFUL f _o F ₂ , f _o F ₁ , f _o E
⊗	f _b E _s
└	ESTIMATED f _o F ₁
†, ‡	f _{min}
^	GREATER THAN
∨	LESS THAN

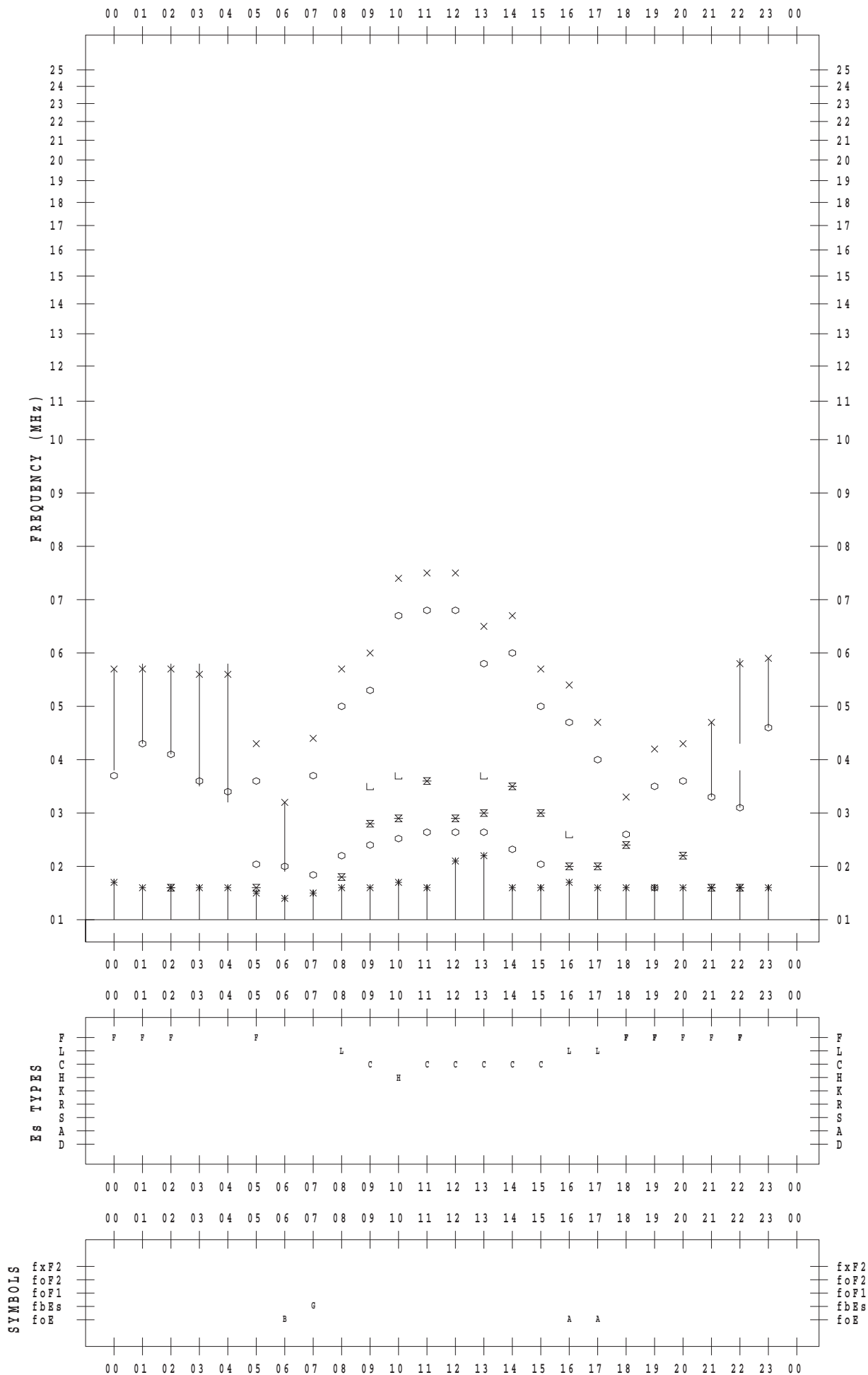
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/ 1

135 ° E MEAN TIME



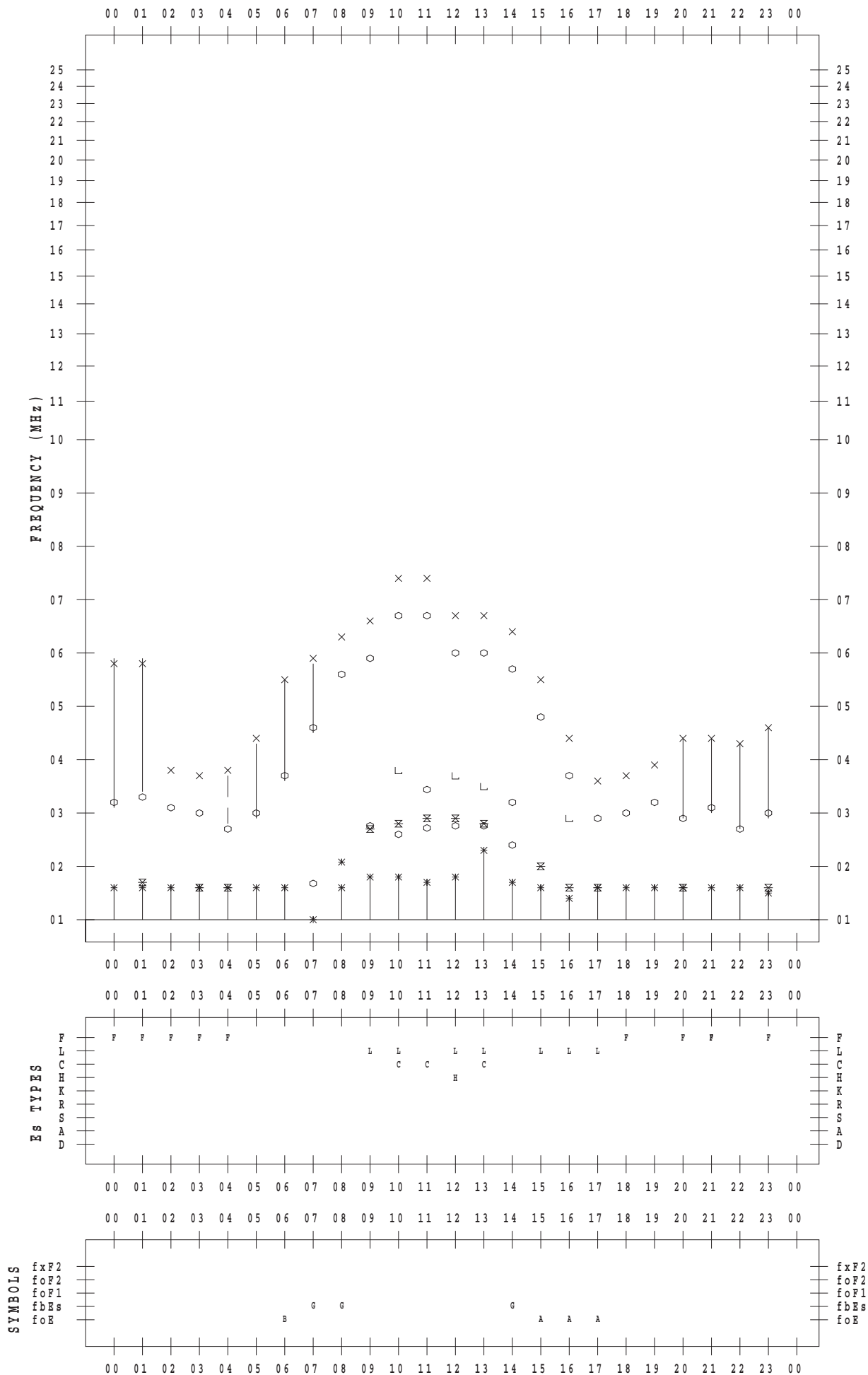
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/ 2

135 ° E MEAN TIME



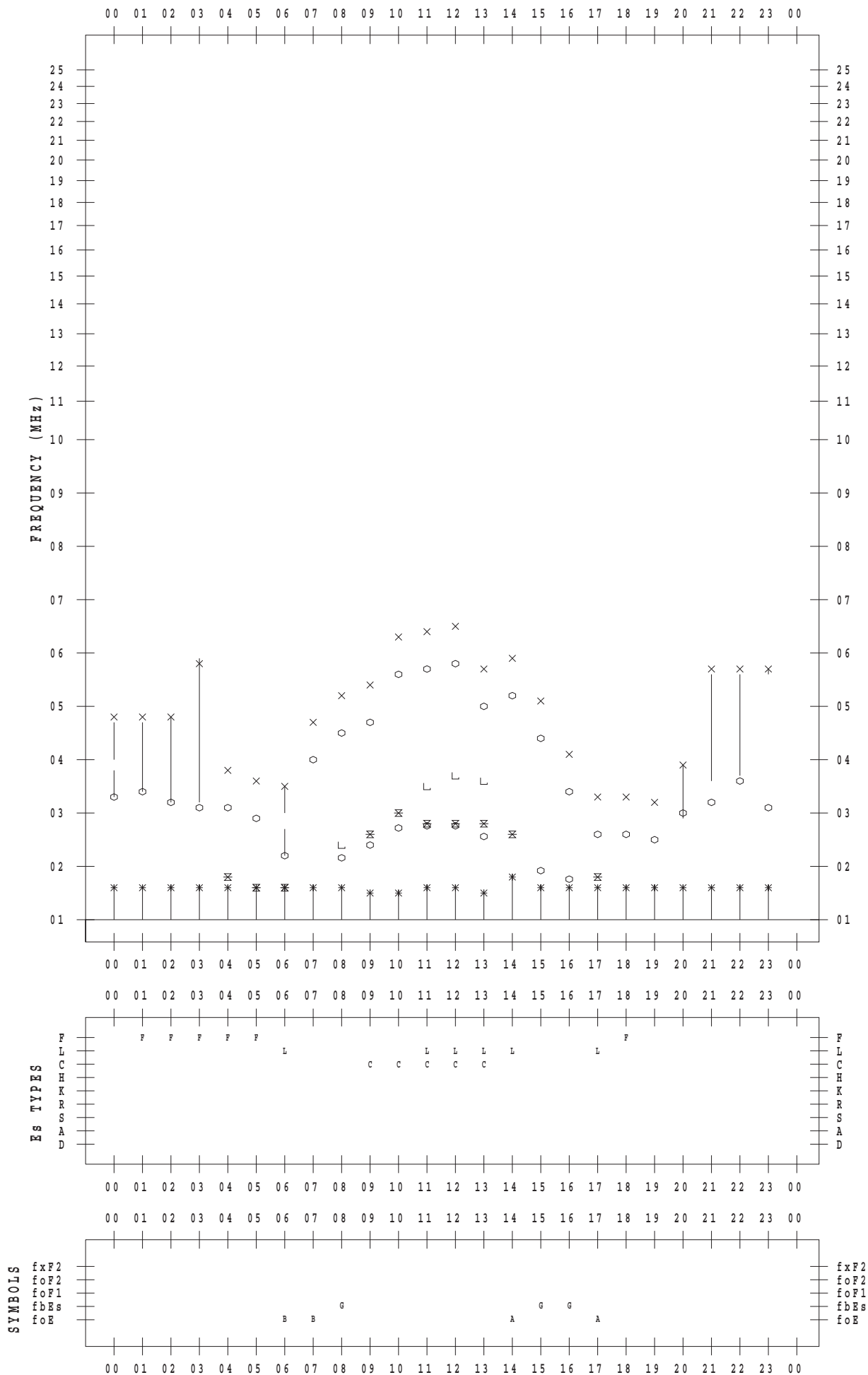
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/ 3

135 ° E MEAN TIME



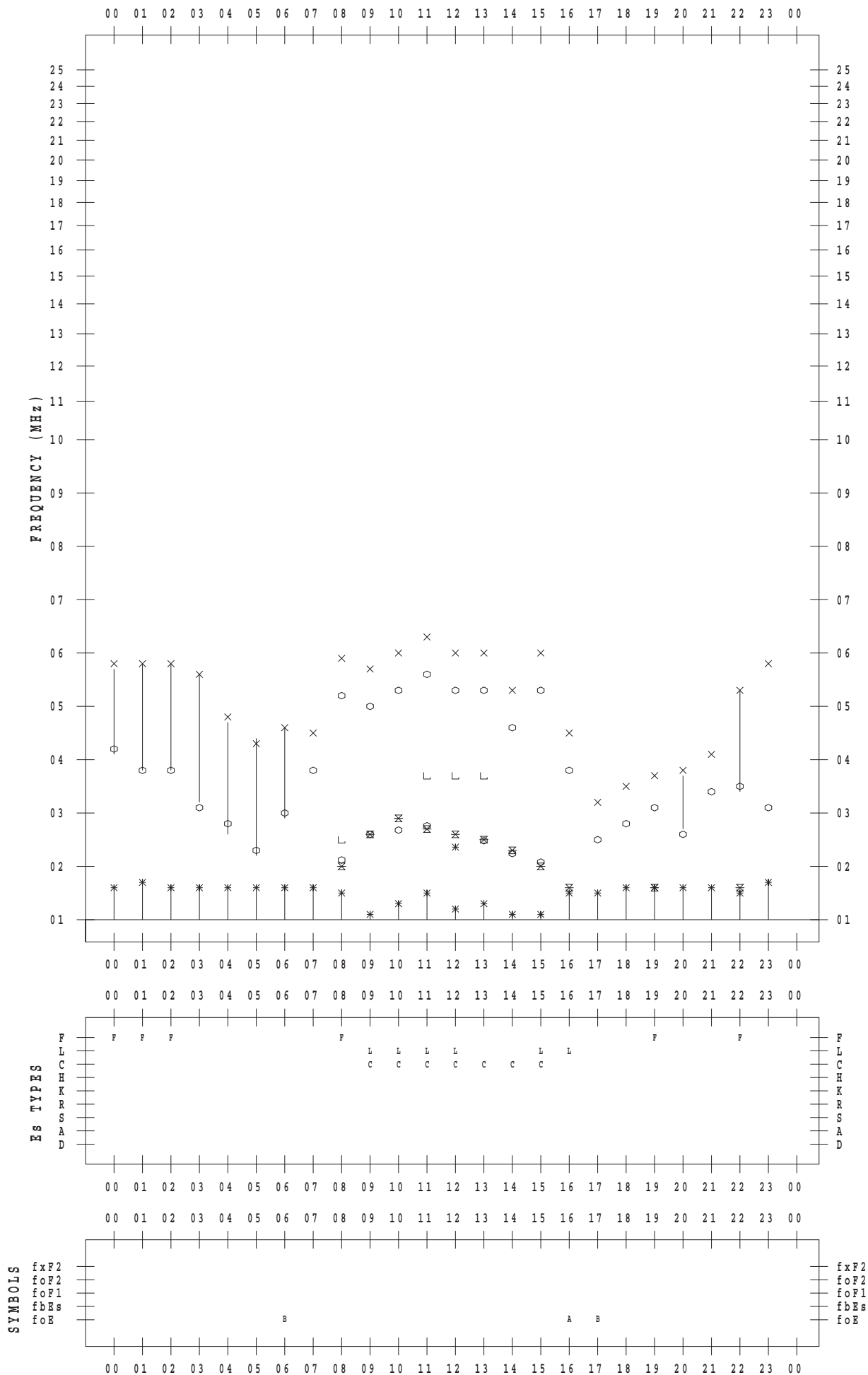
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/4

135 ° E MEAN TIME



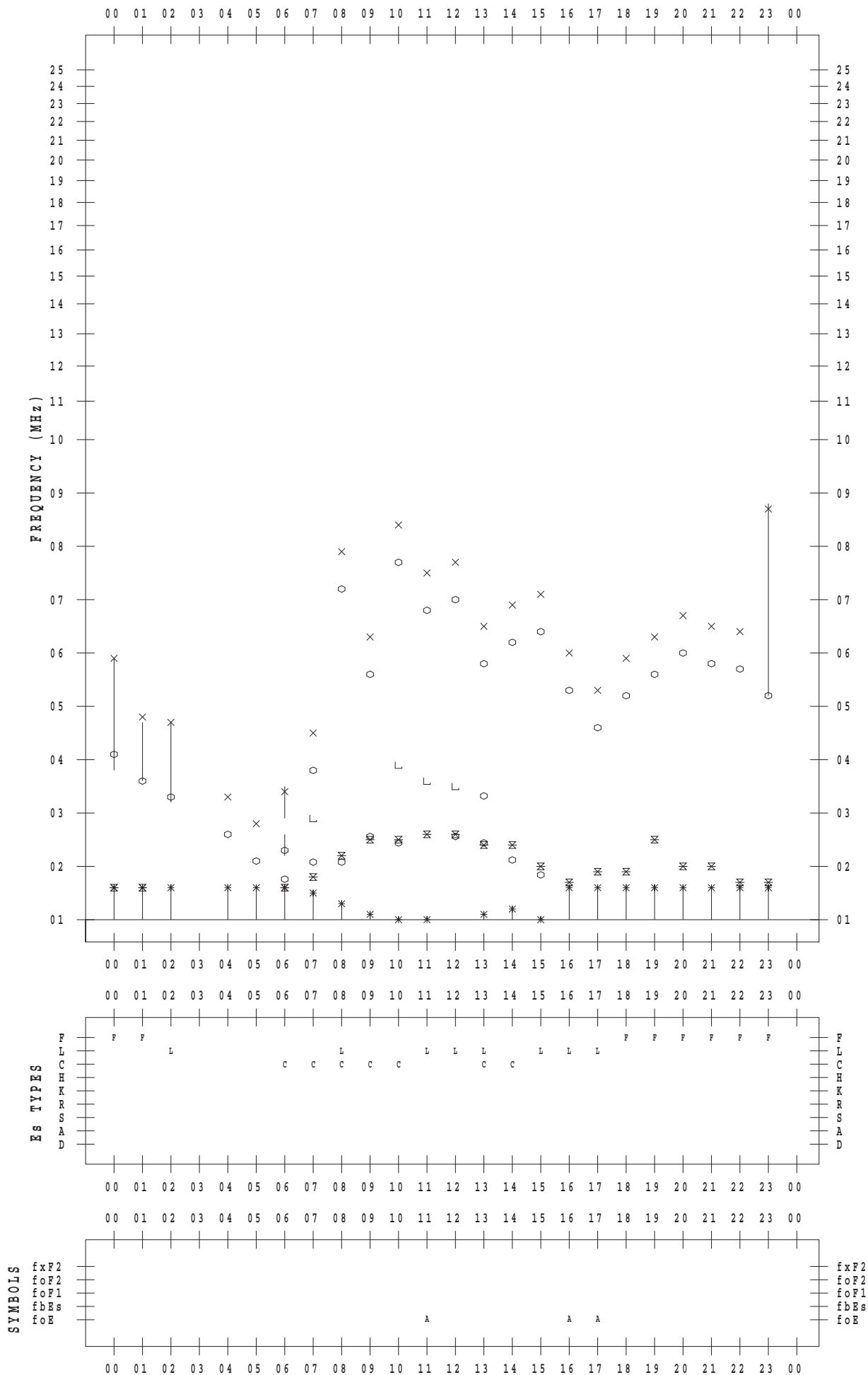
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/ 5

135 ° E MEAN TIME



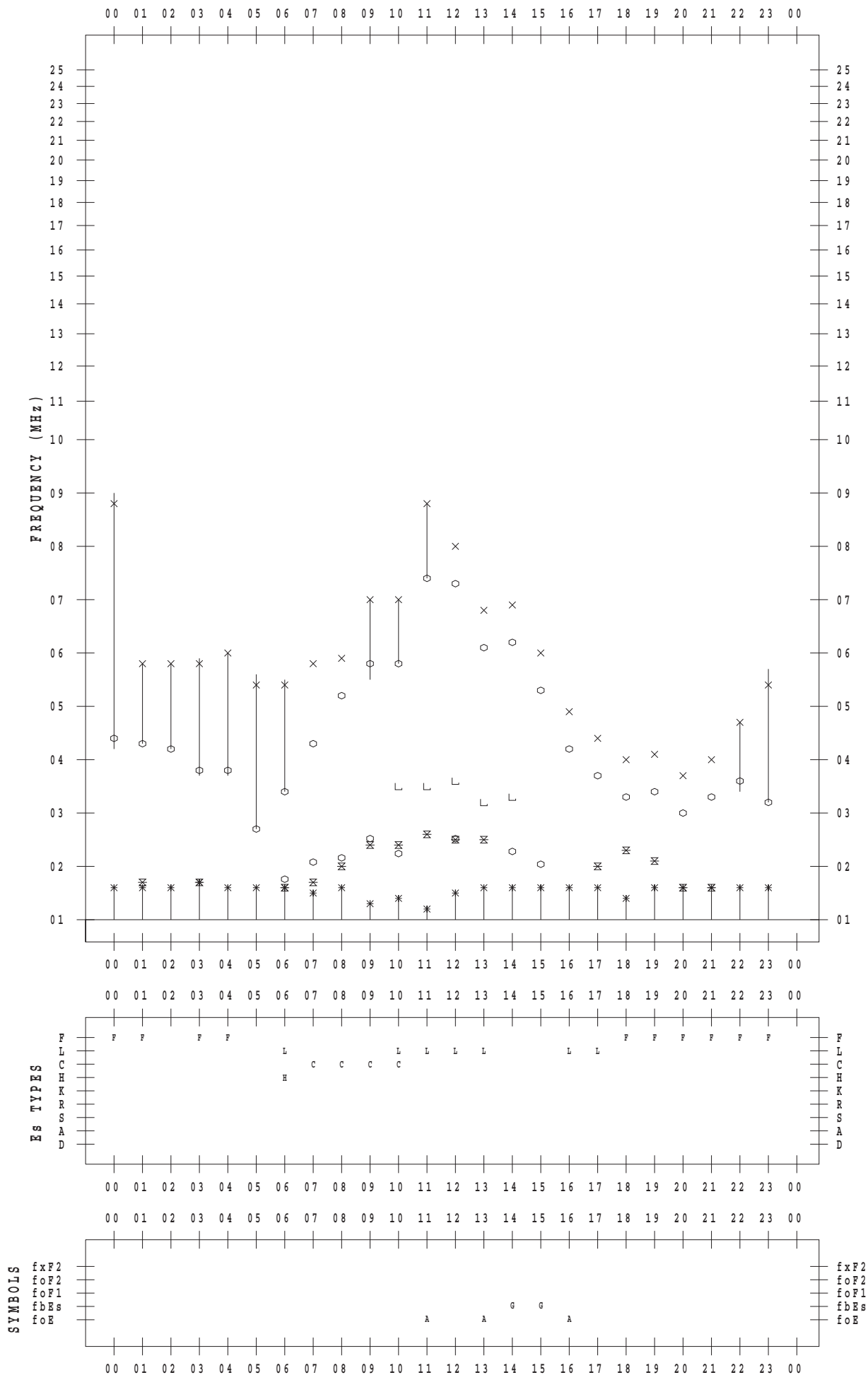
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/ 6

135 ° E MEAN TIME



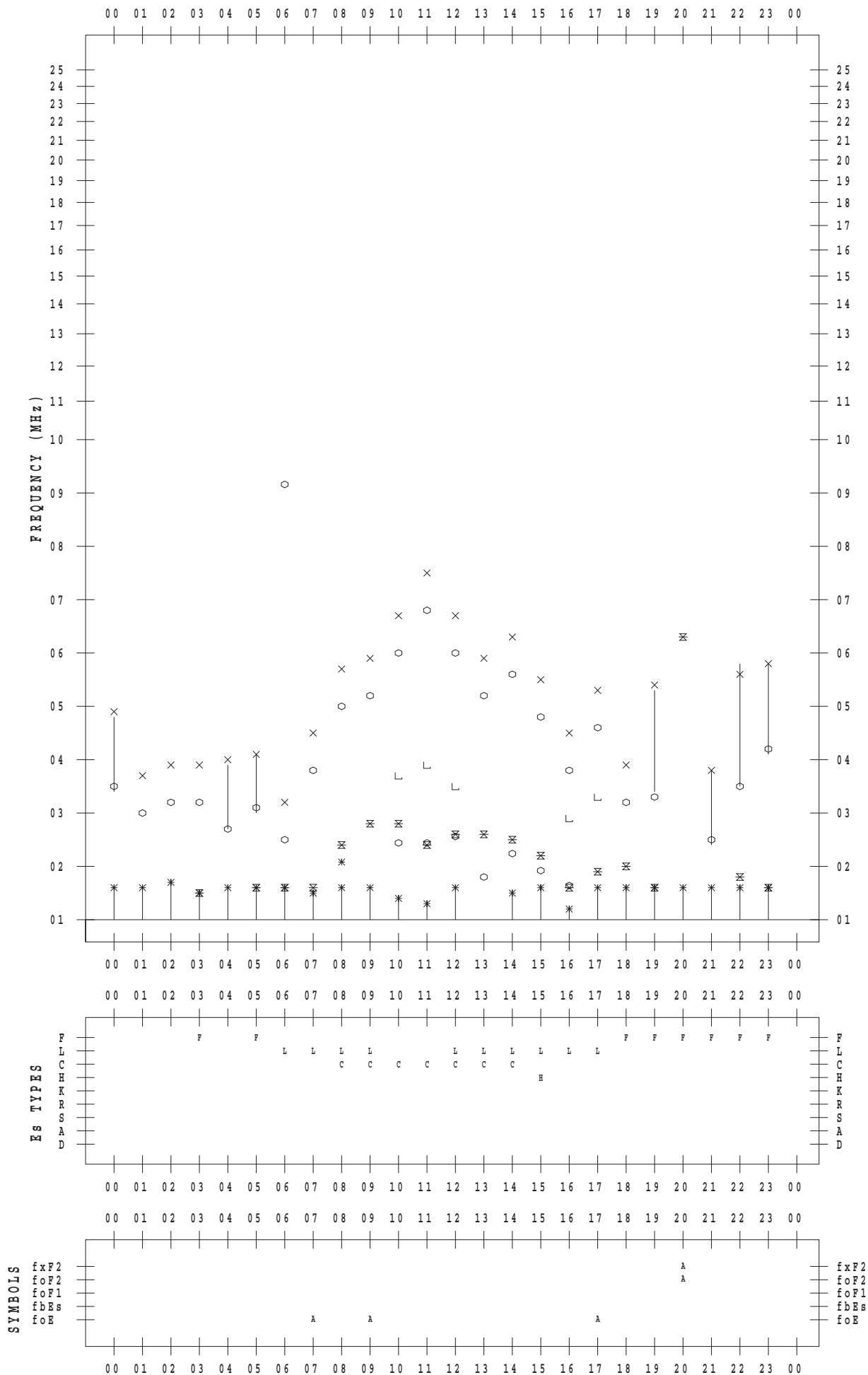
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/7

135 ° E MEAN TIME



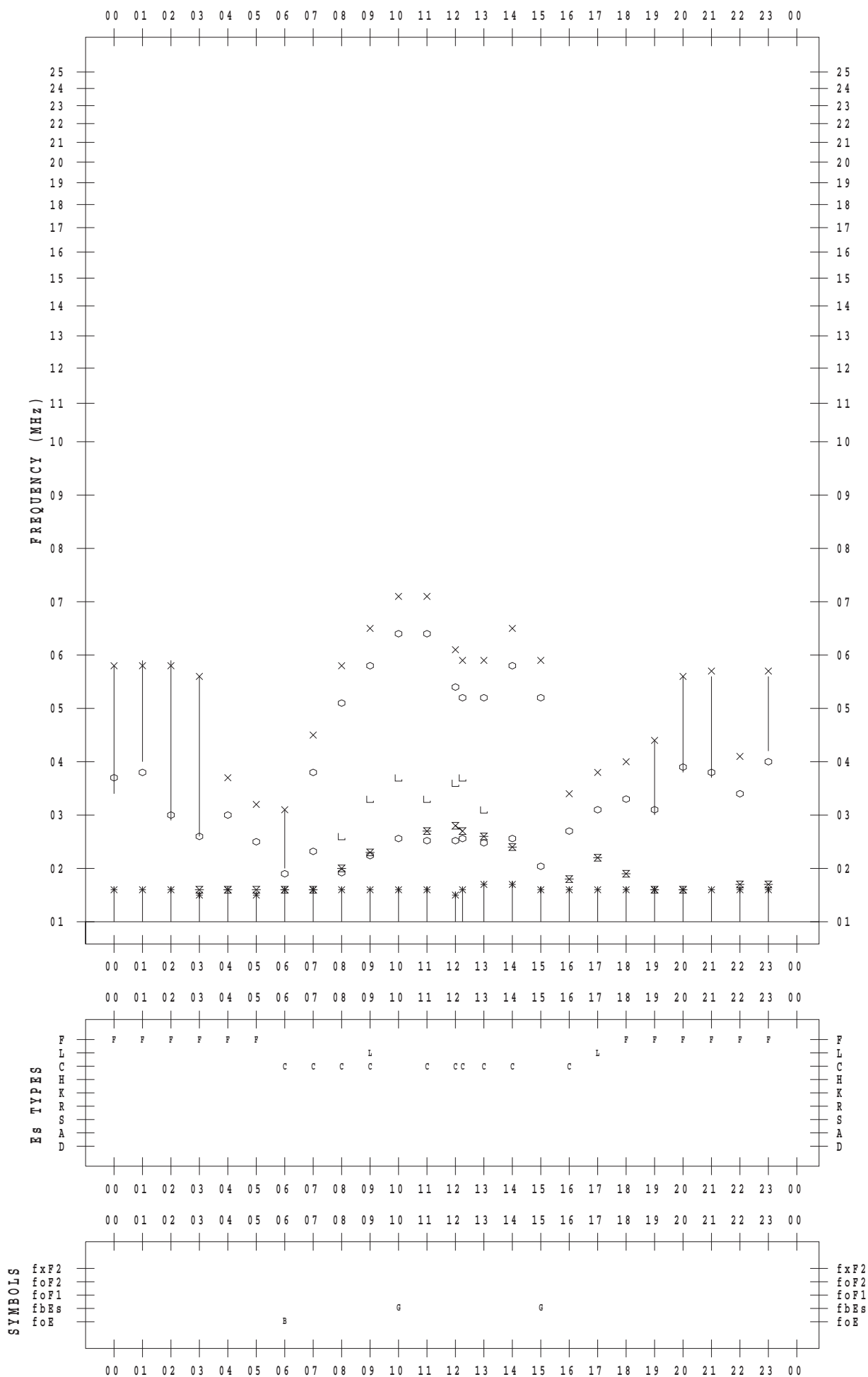
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/ 8

135 ° E MEAN TIME



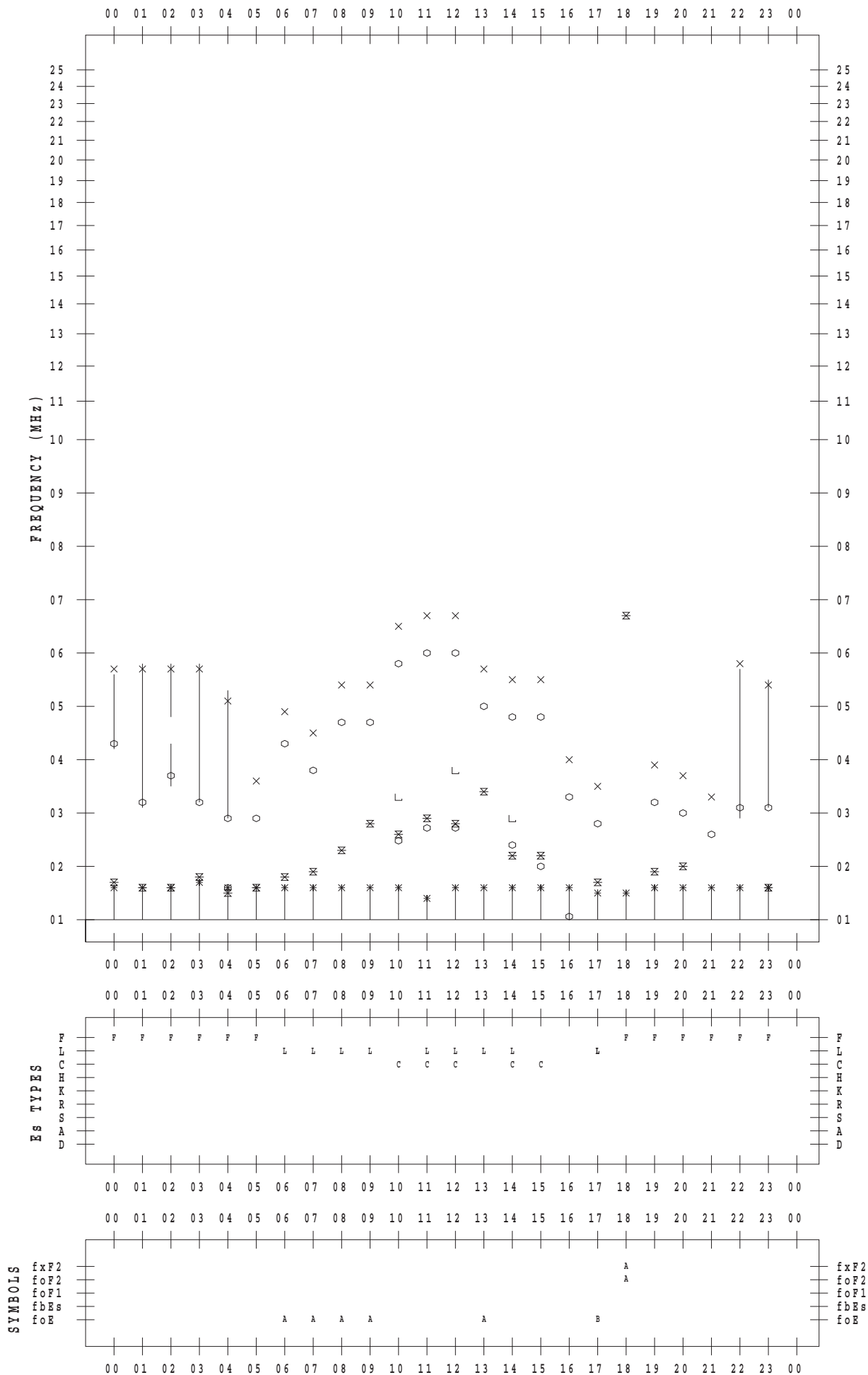
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/9

135 ° E MEAN TIME



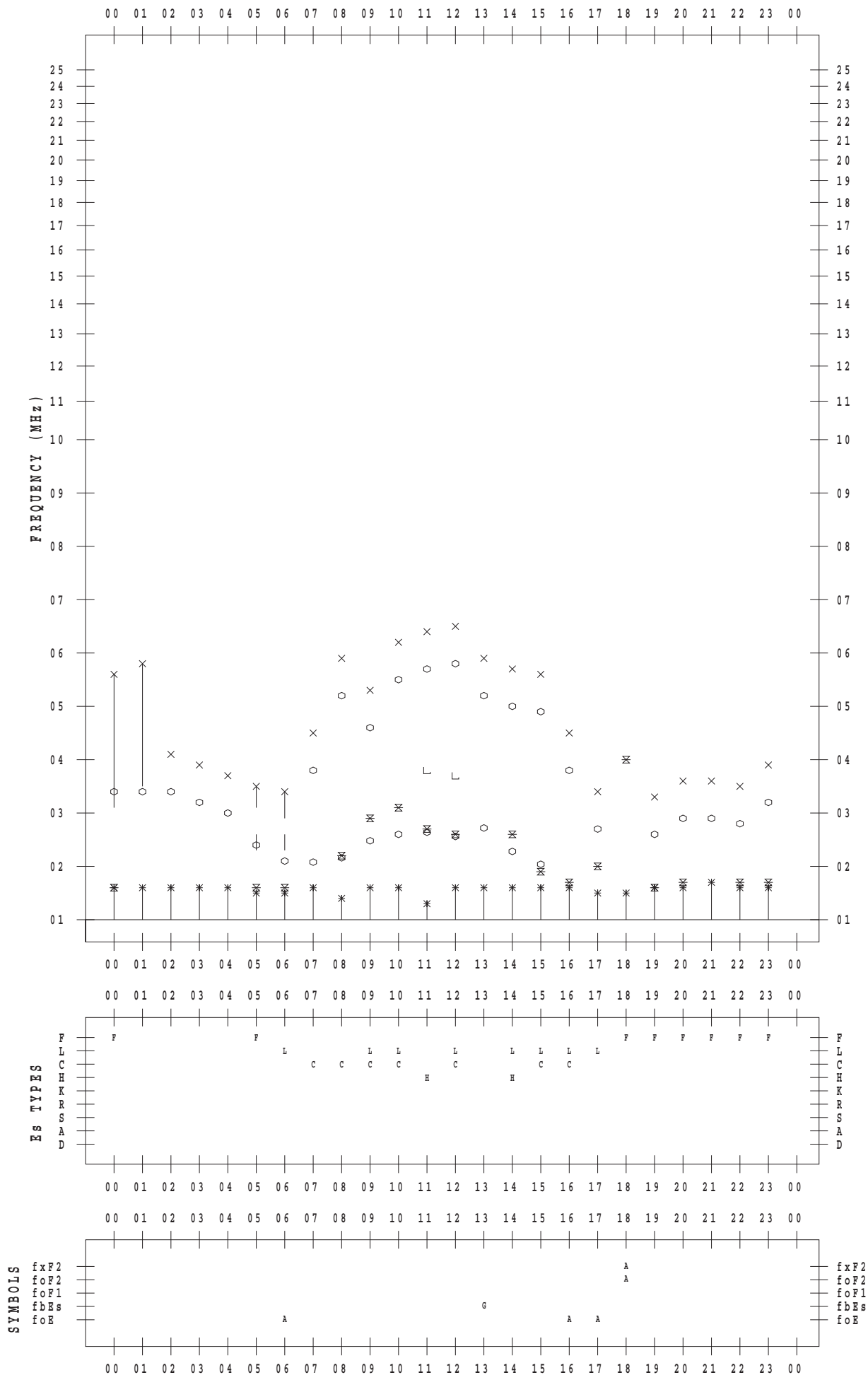
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/10

135 ° E MEAN TIME



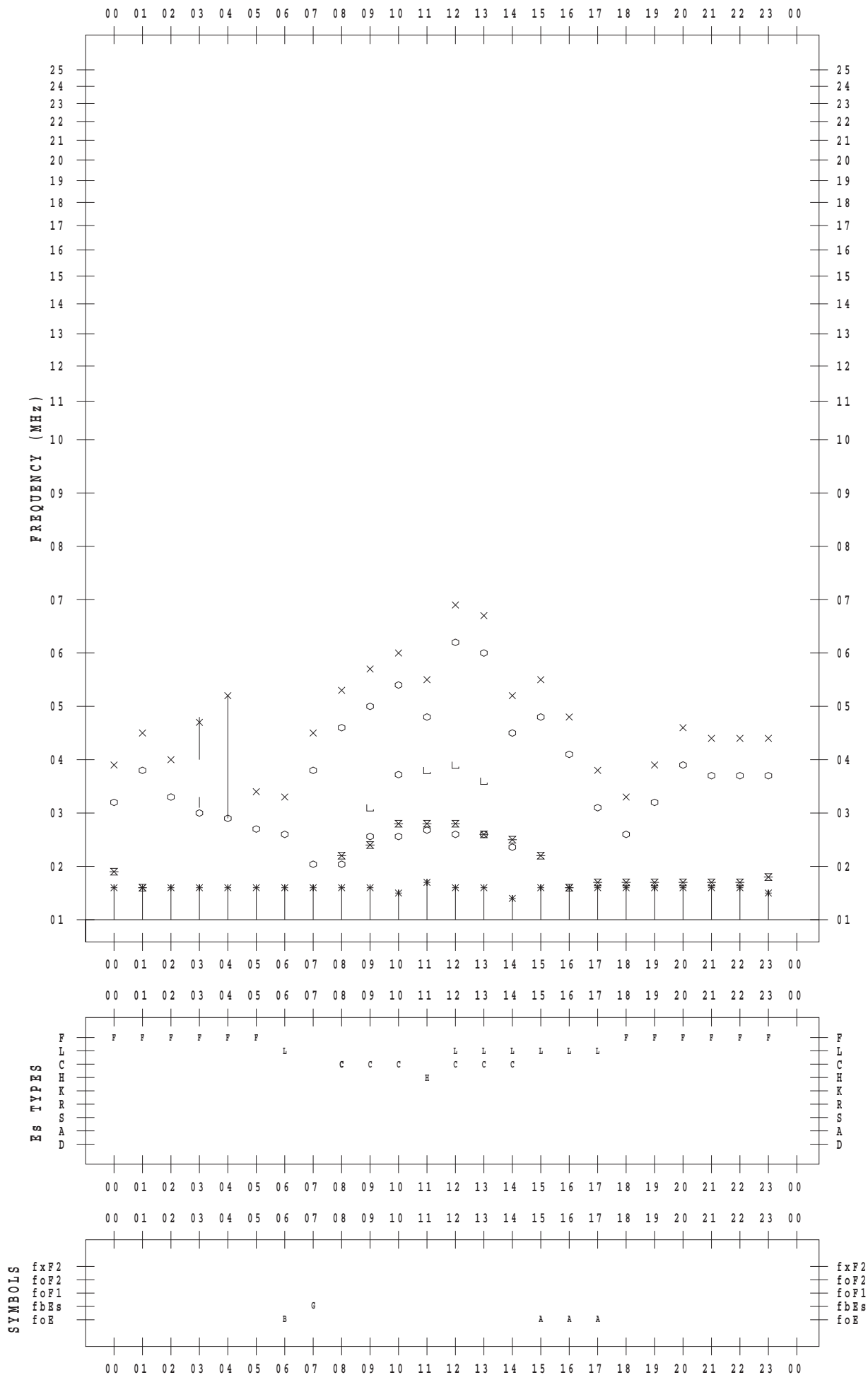
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/11

135 ° E MEAN TIME



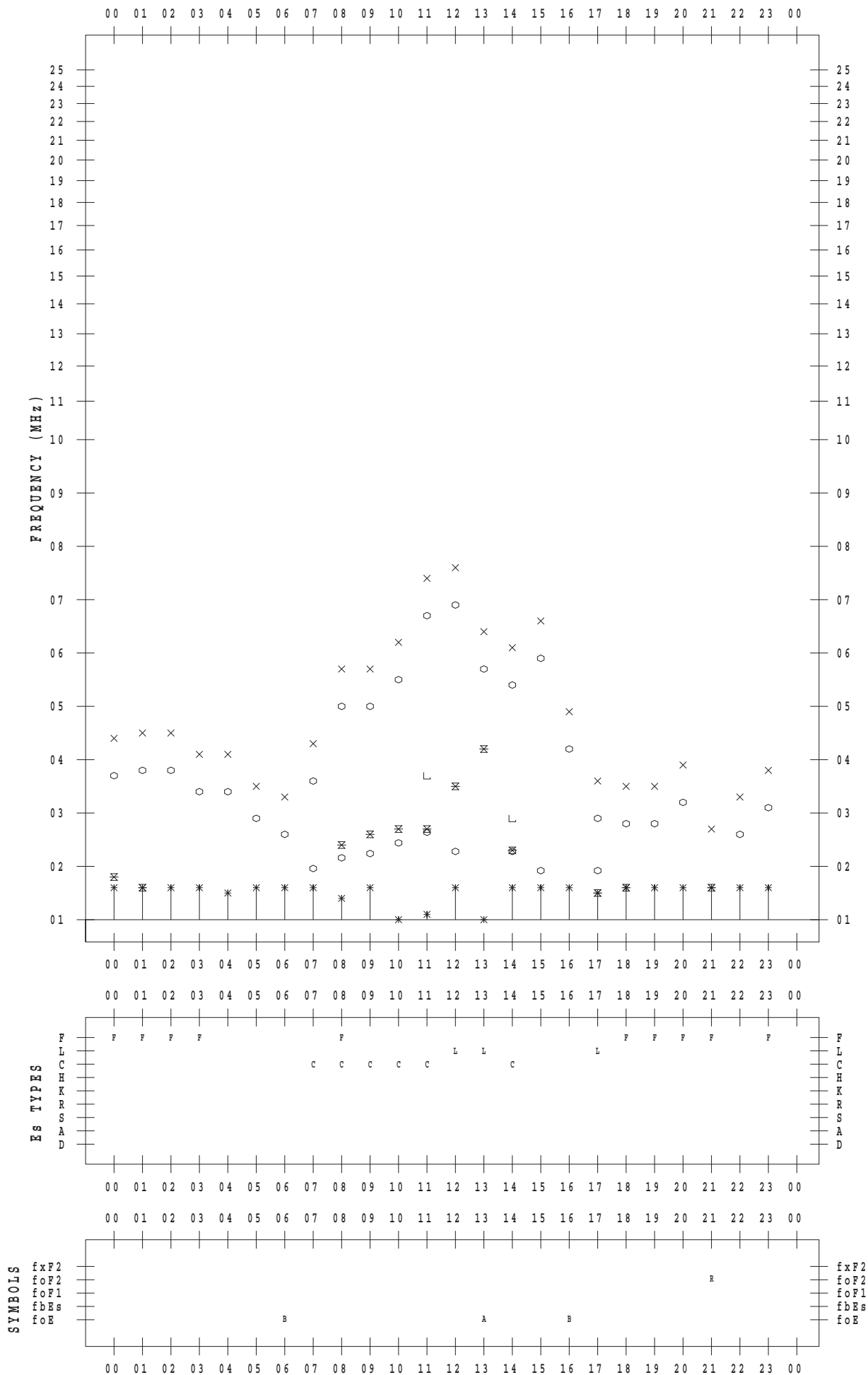
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/12

135 ° E MEAN TIME



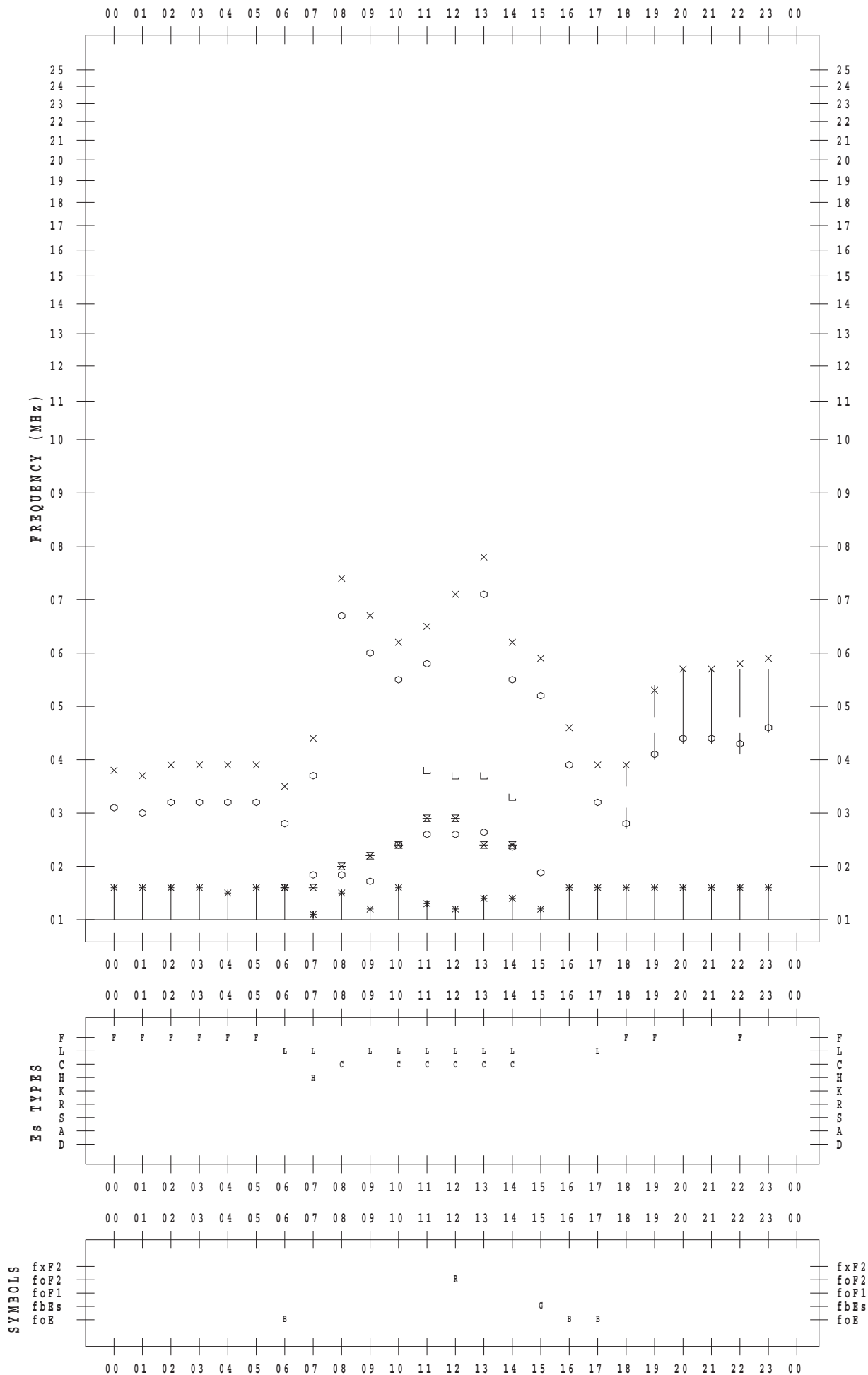
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SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/13

135 ° E MEAN TIME



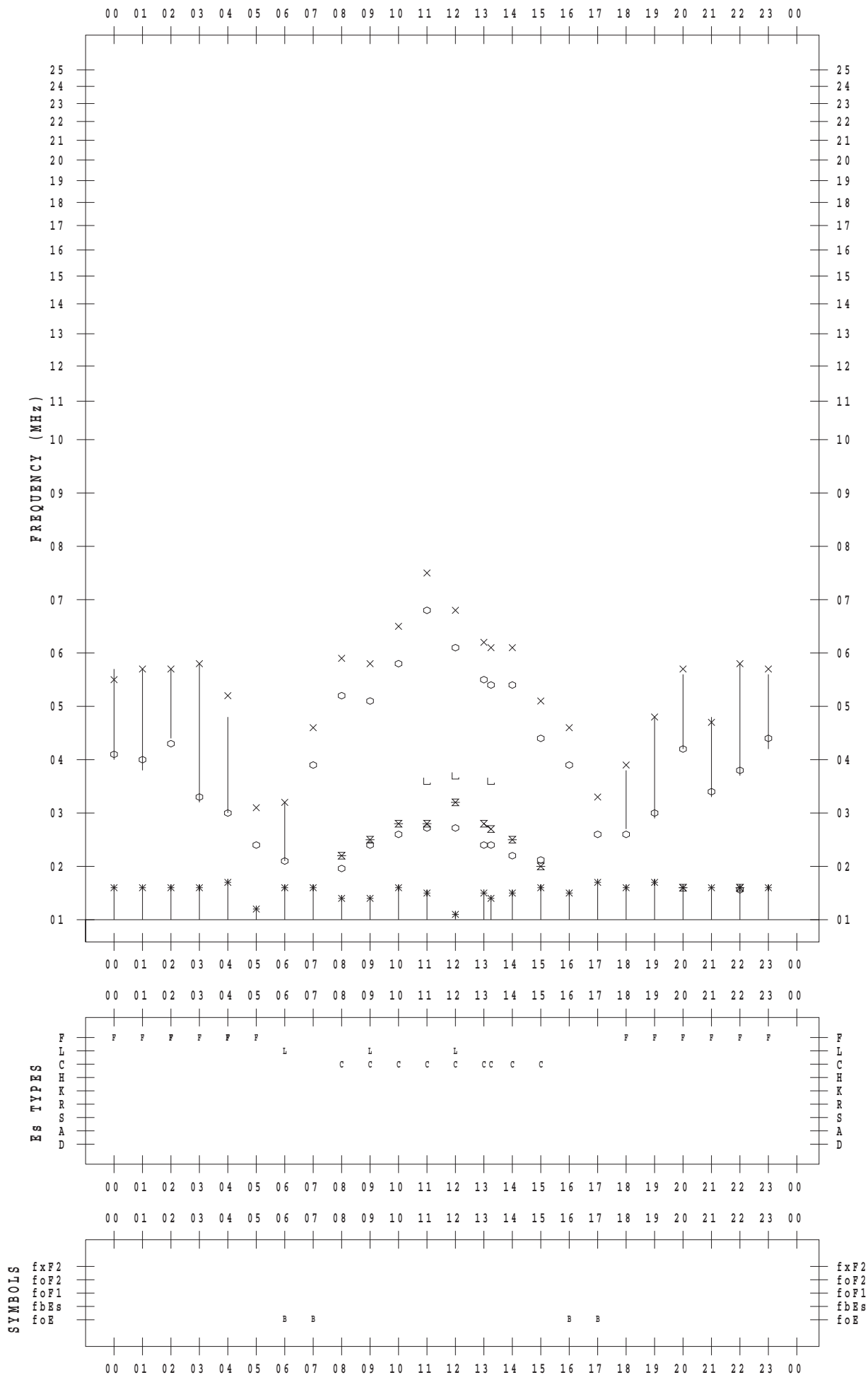
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/14

135 ° E MEAN TIME



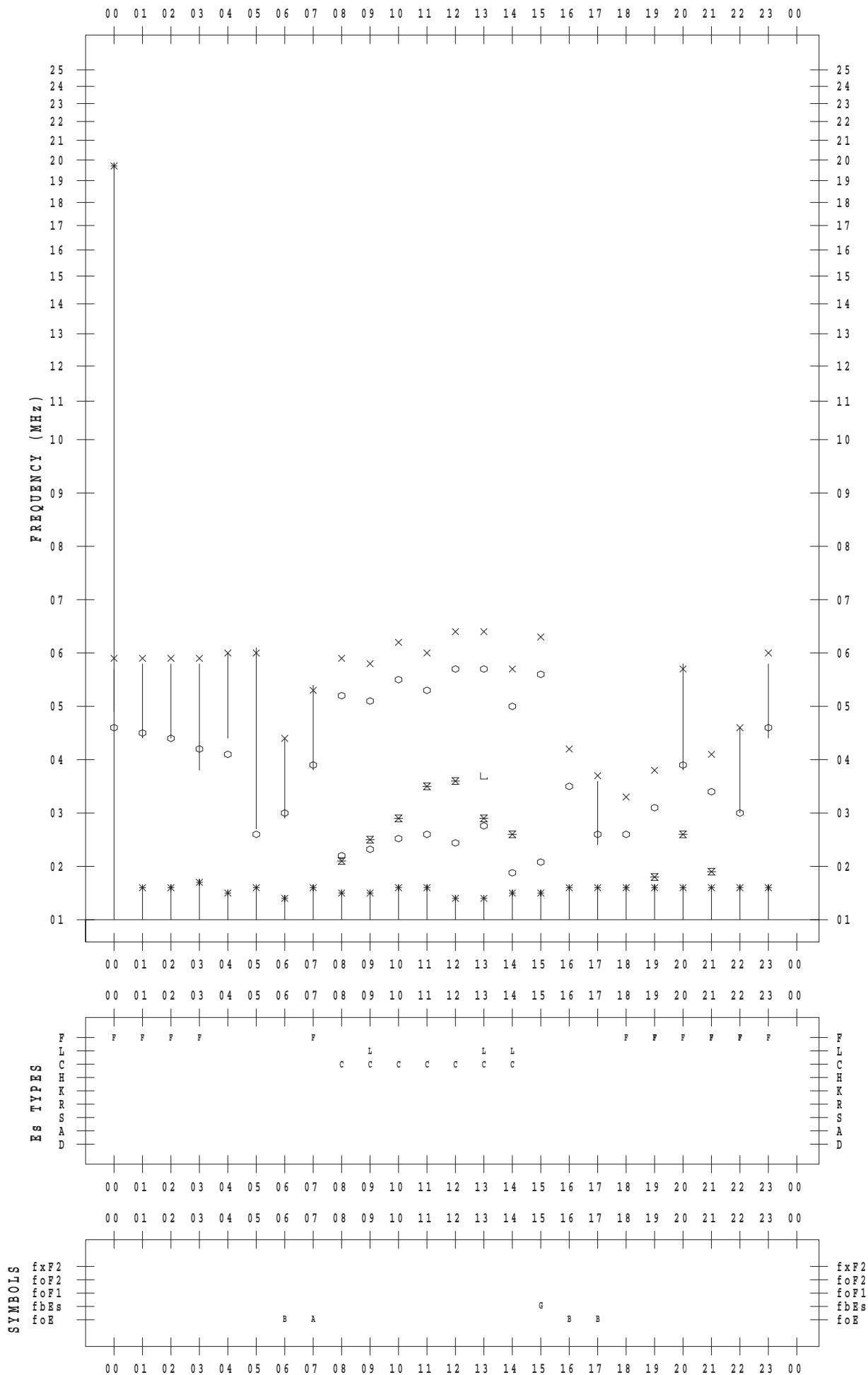
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/15

135 ° E MEAN TIME



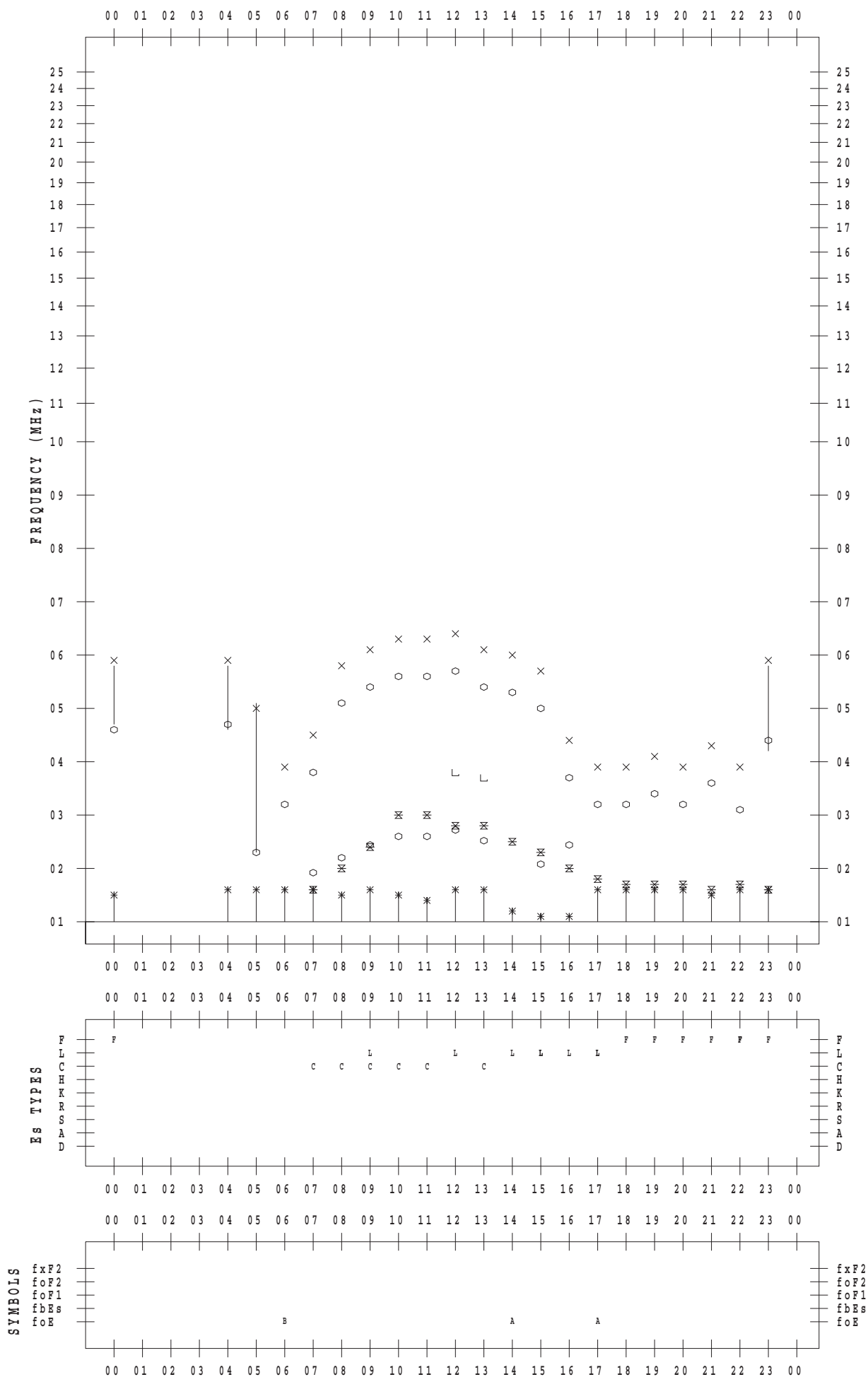
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/16

135 ° E MEAN TIME



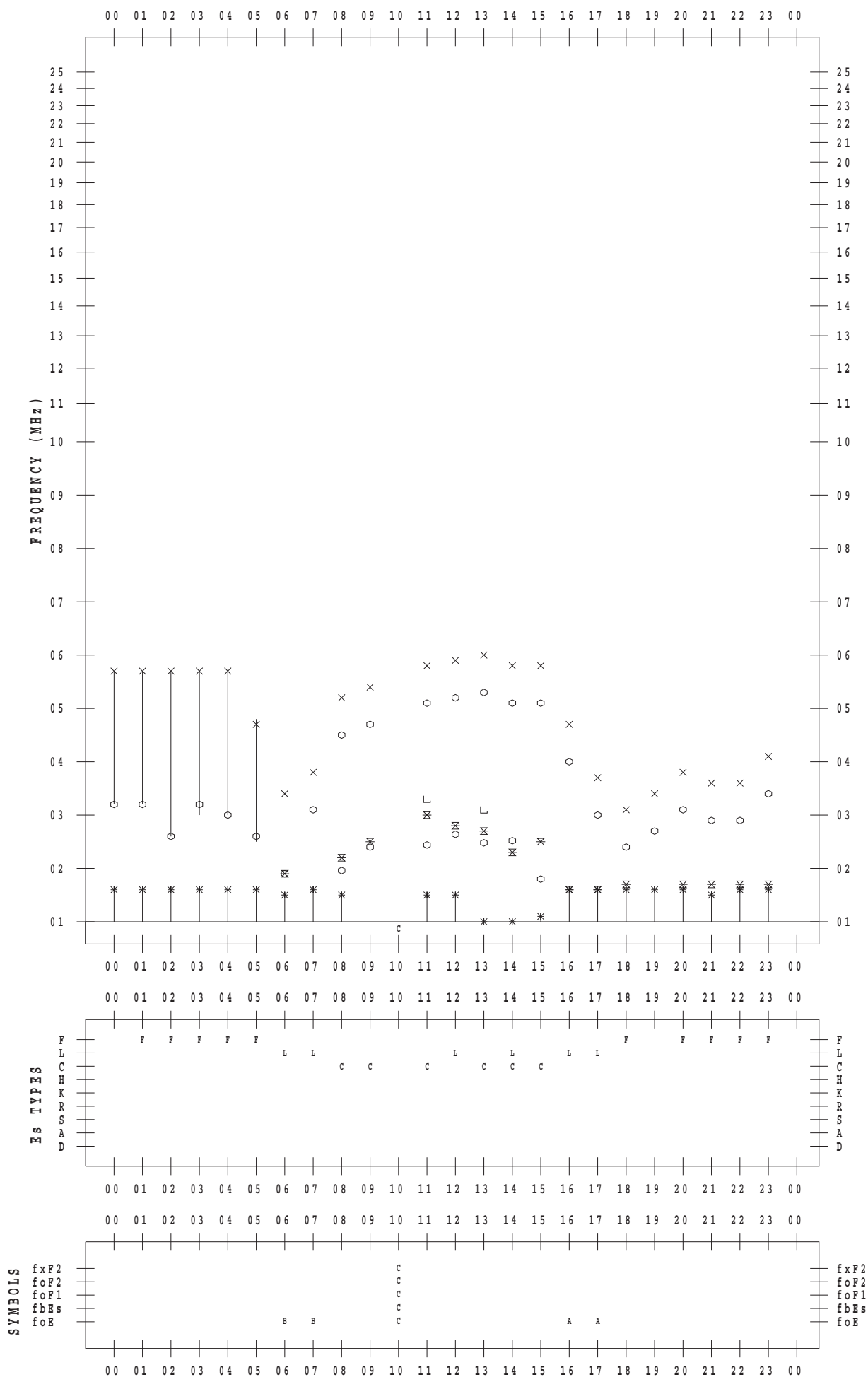
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/17

135 ° E MEAN TIME



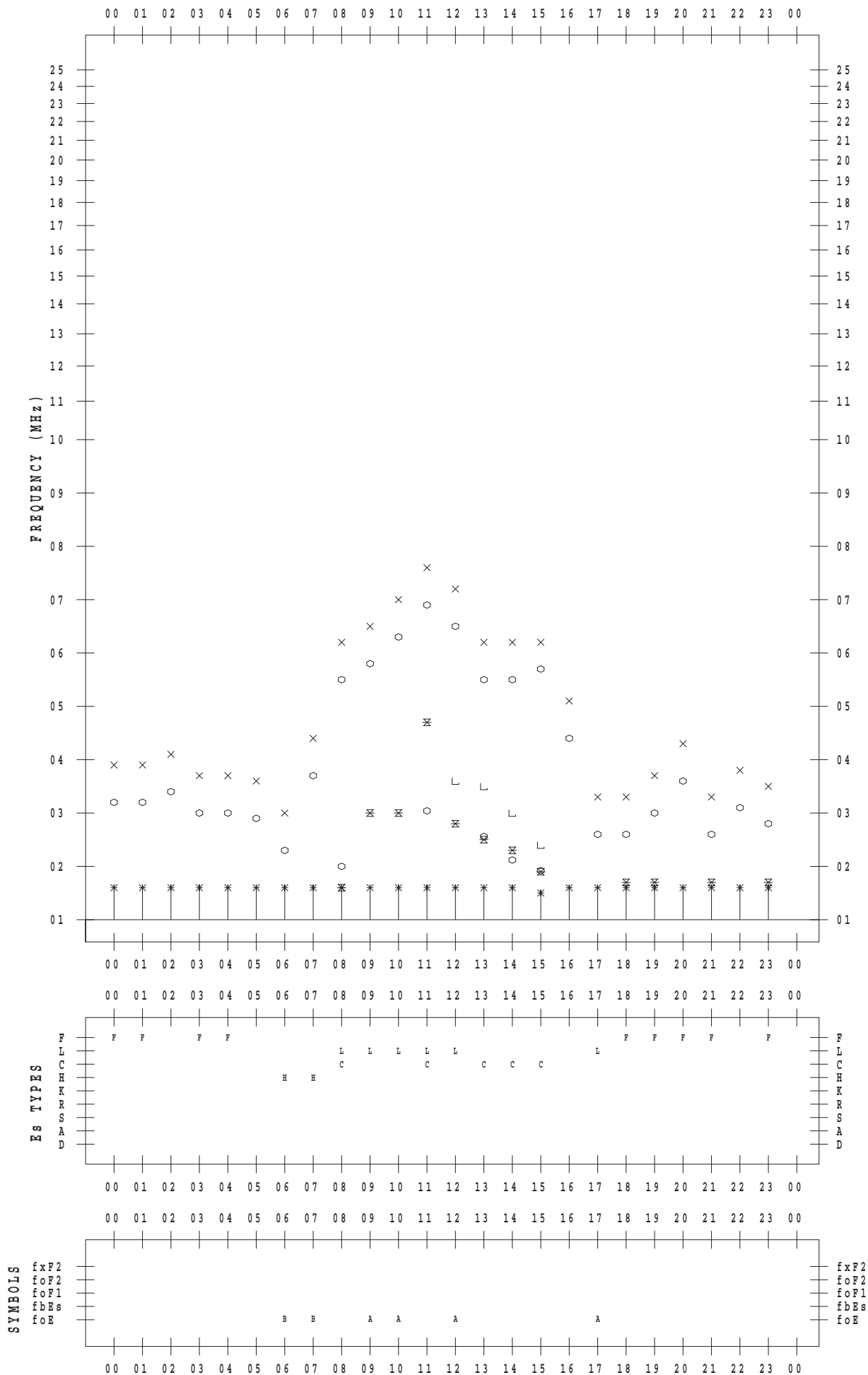
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/18

135 ° E MEAN TIME



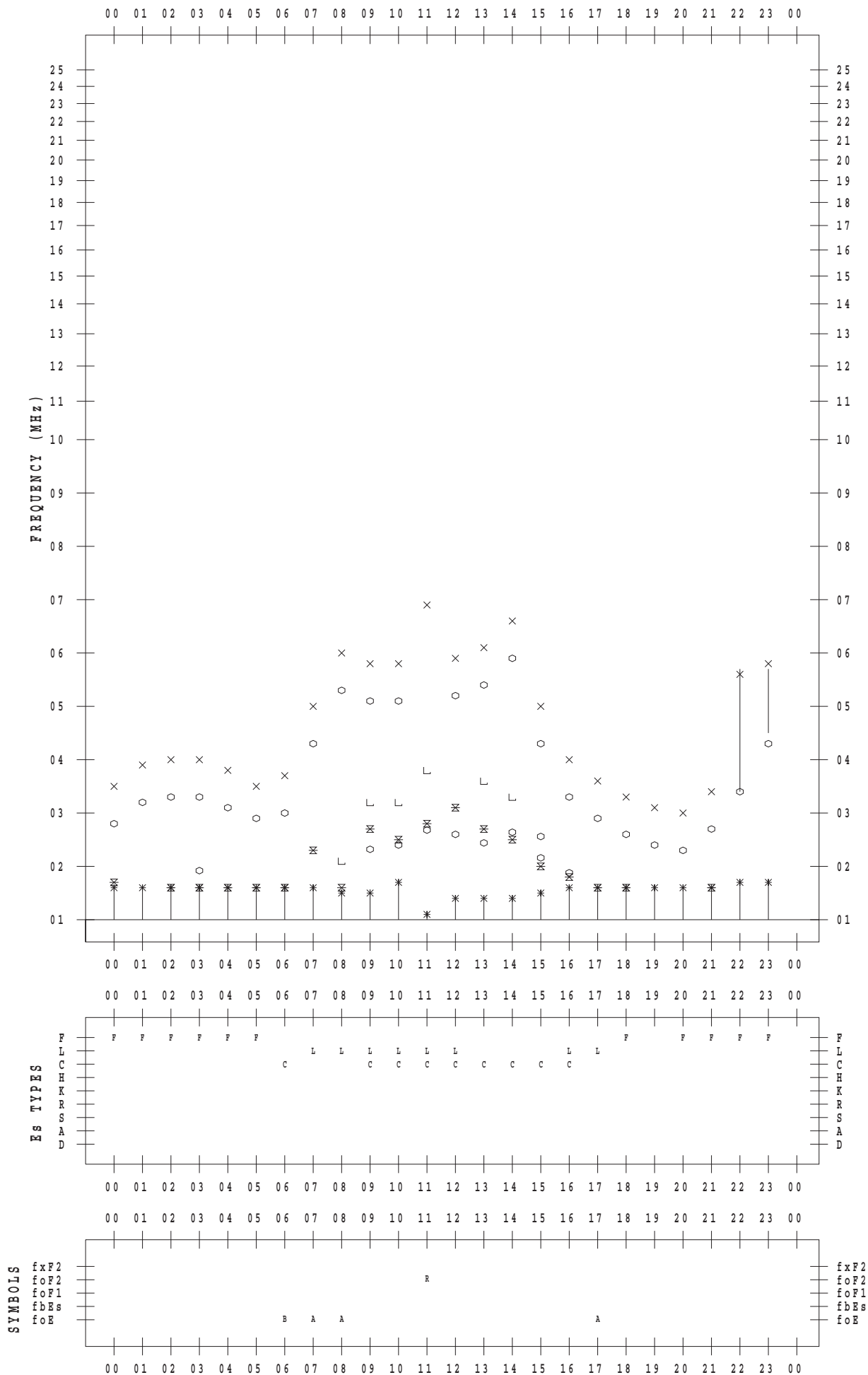
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/19

135 ° E MEAN TIME



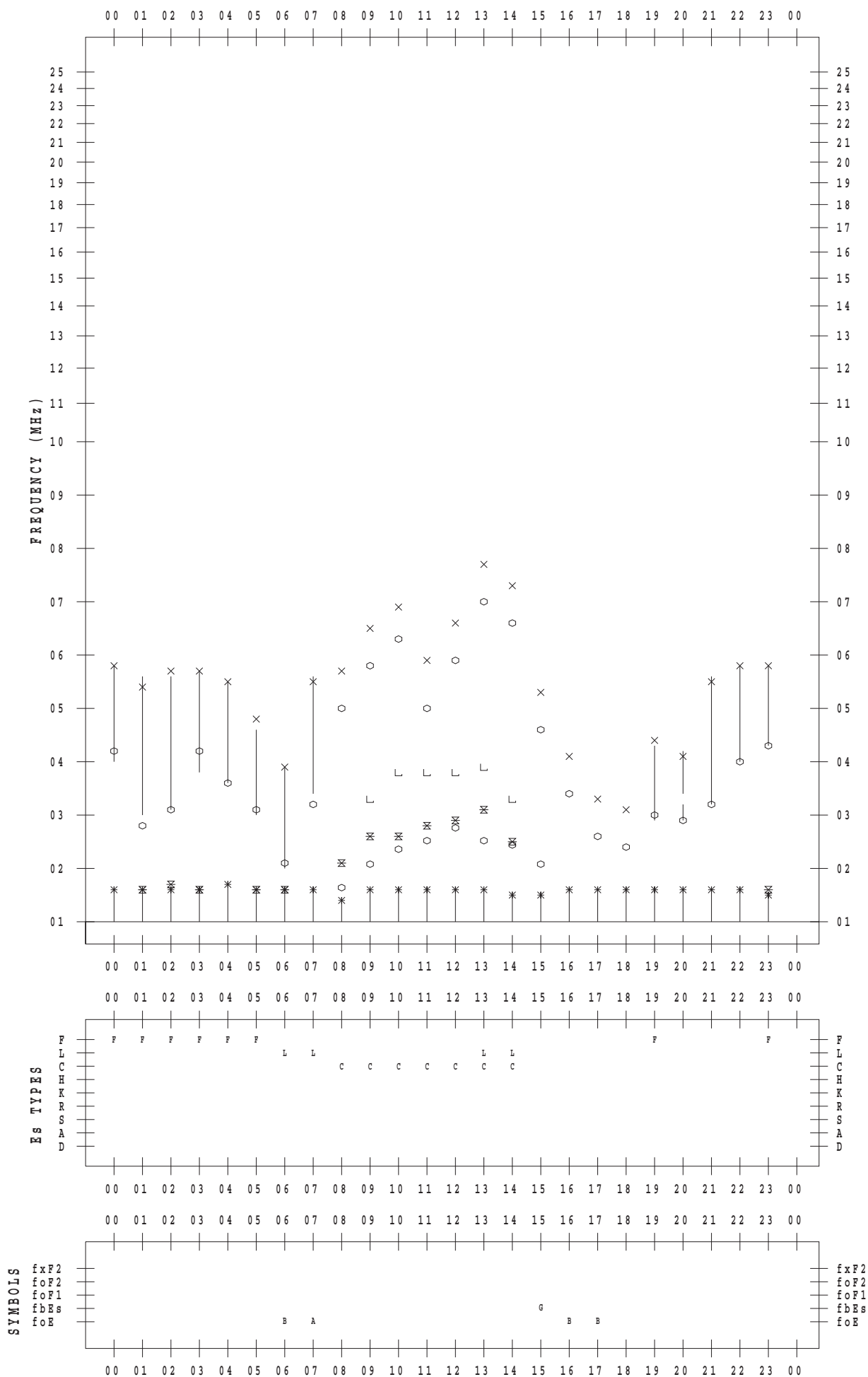
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/20

135 ° E MEAN TIME



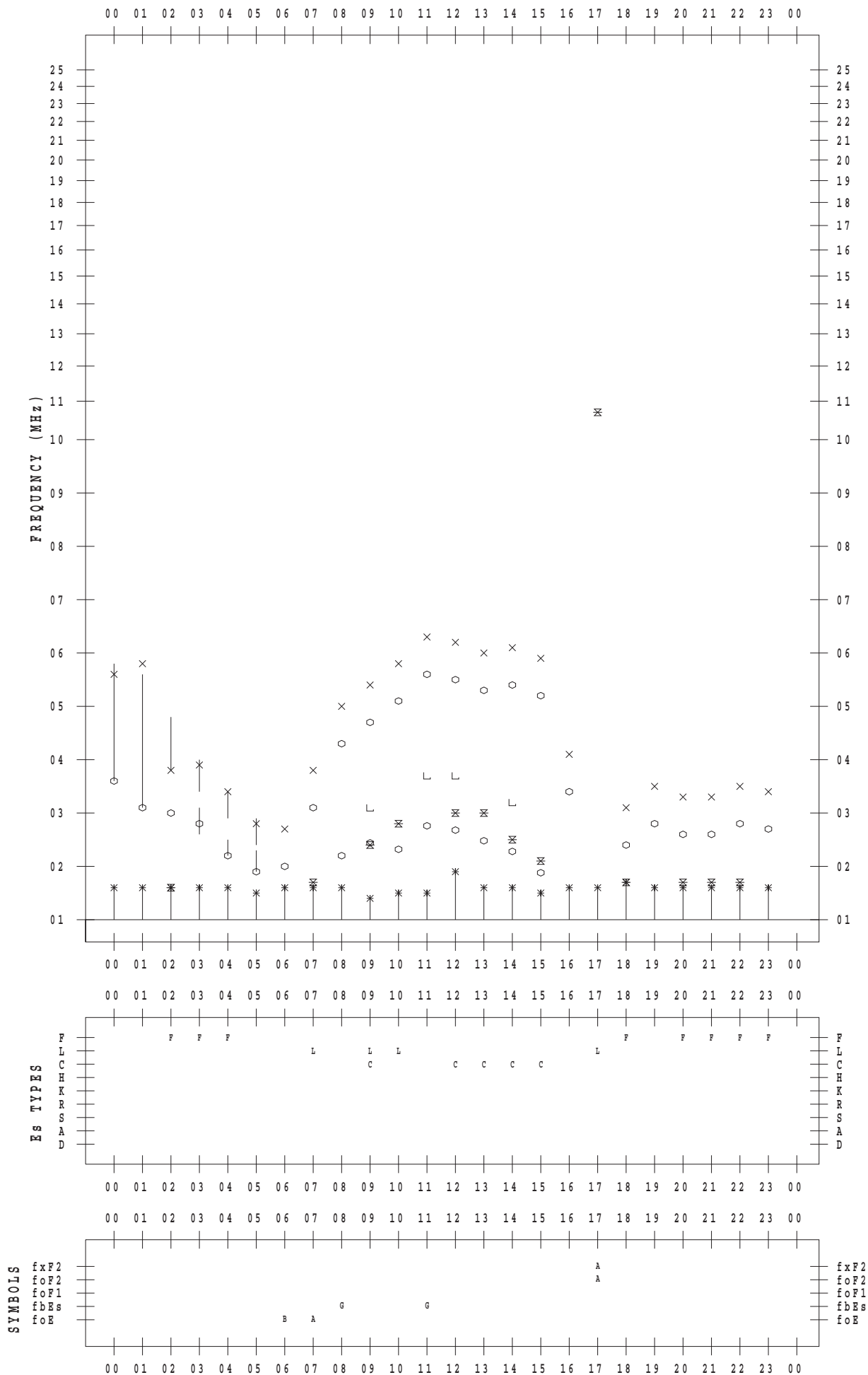
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/21

135 ° E MEAN TIME



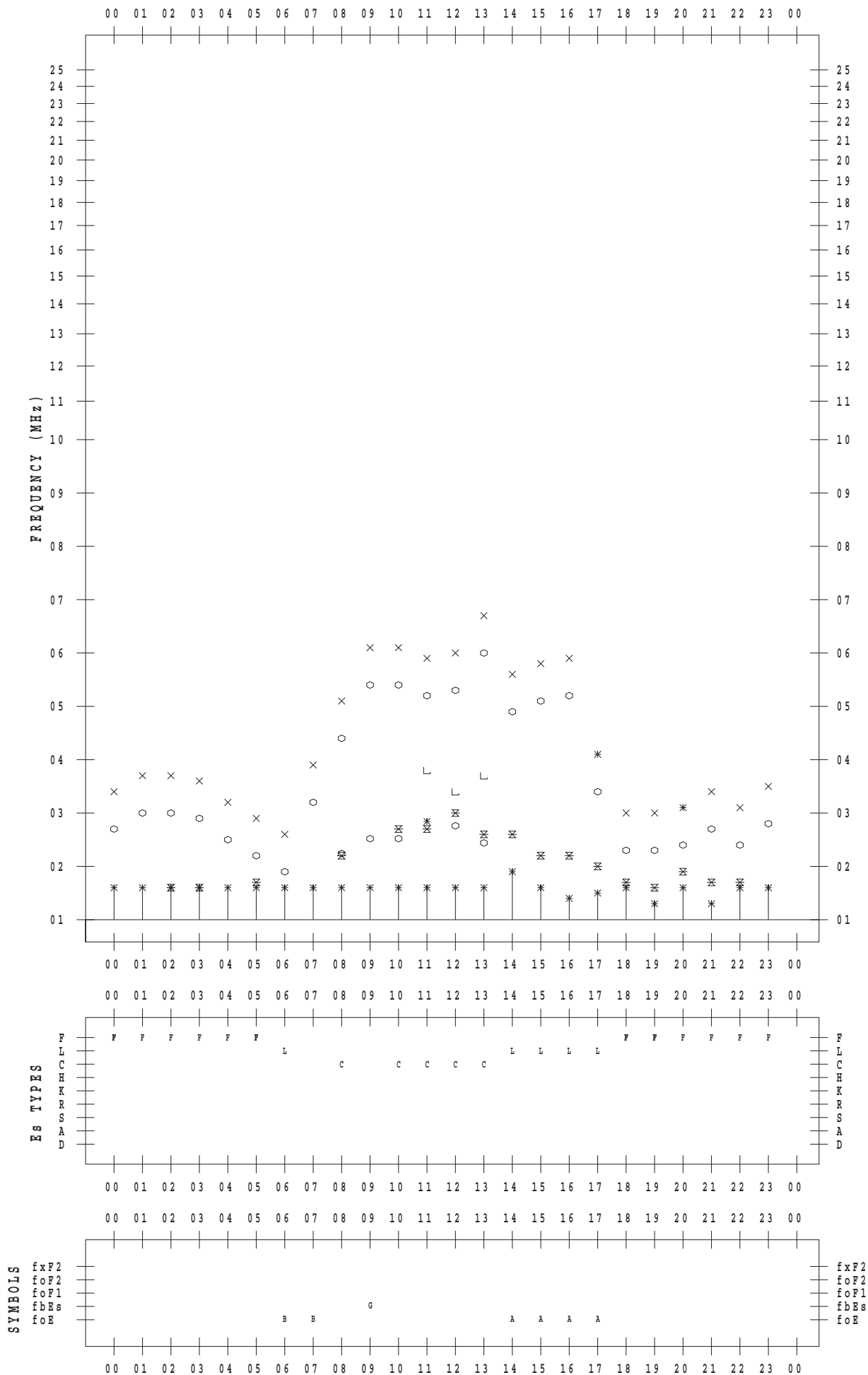
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/22

135 ° E MEAN TIME



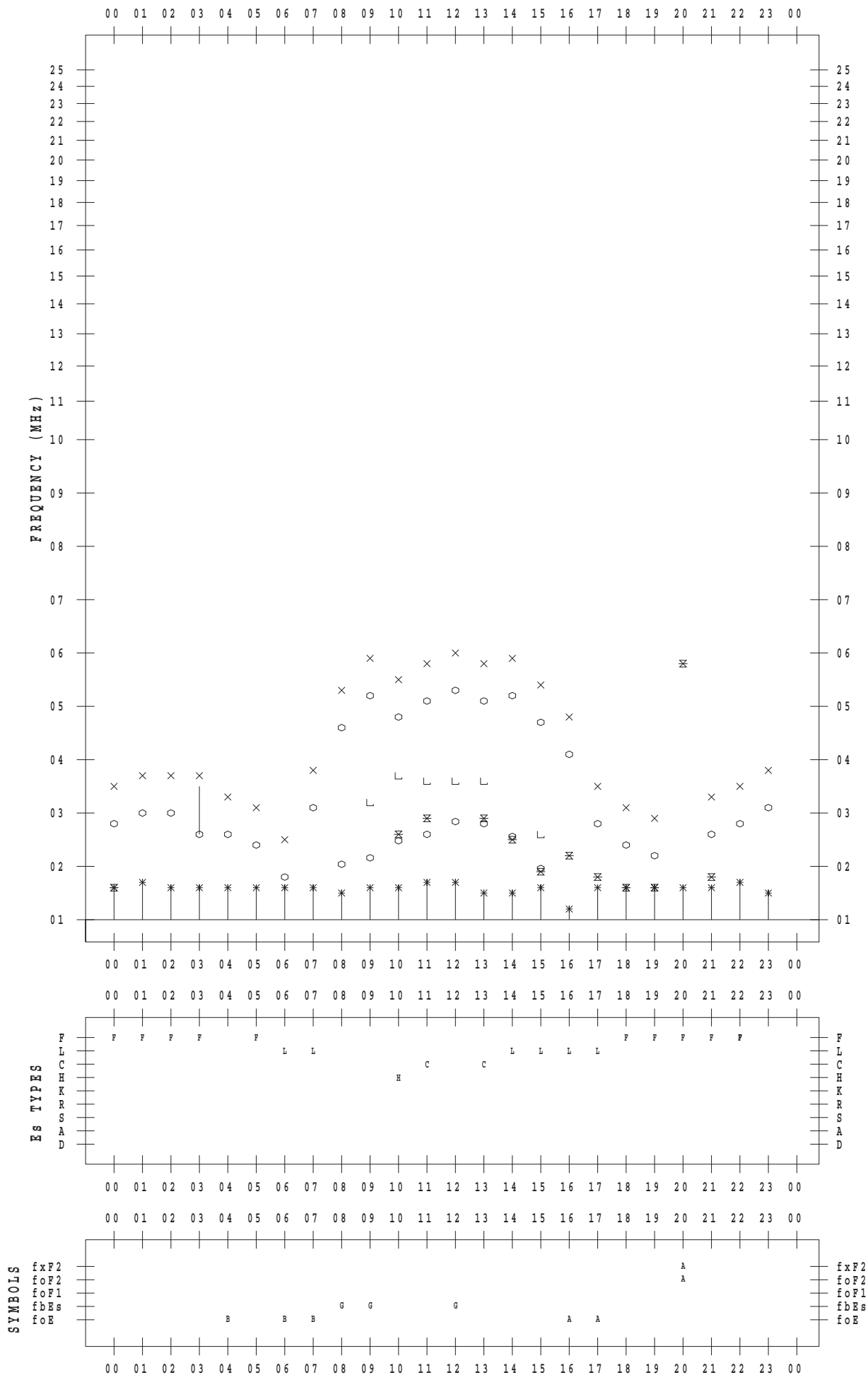
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/23

135 ° E MEAN TIME



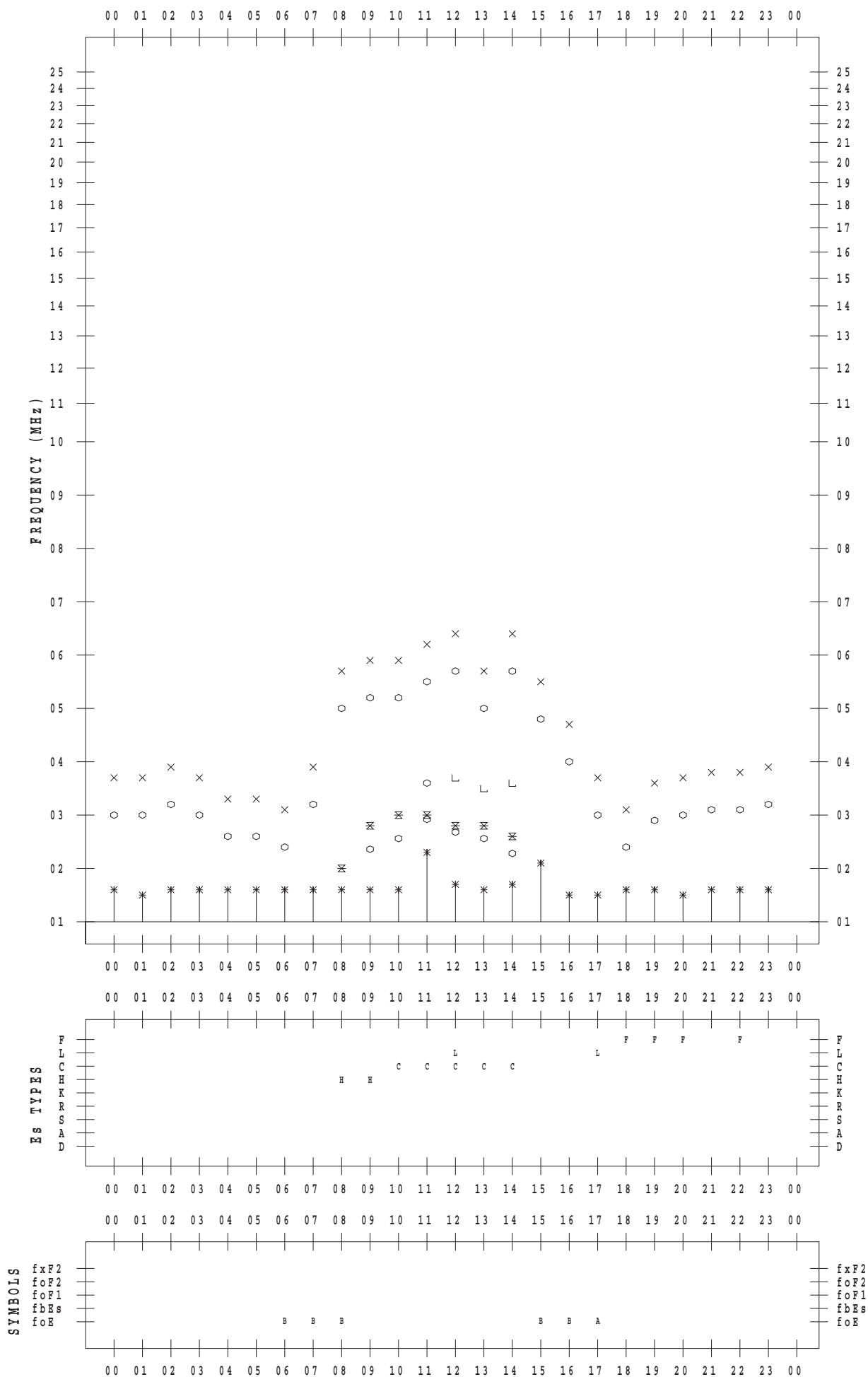
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/24

135 ° E MEAN TIME



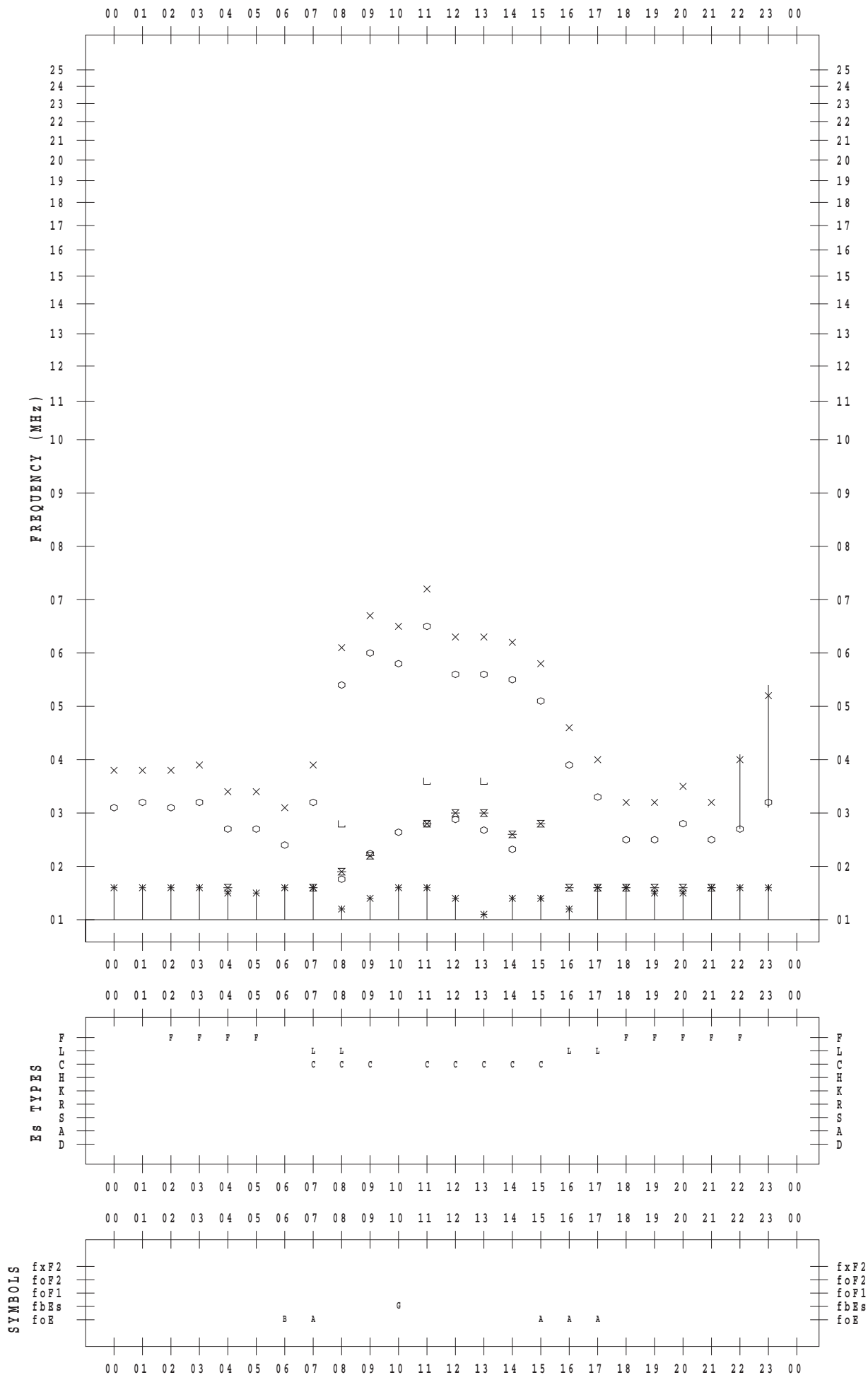
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/25

135 ° E MEAN TIME



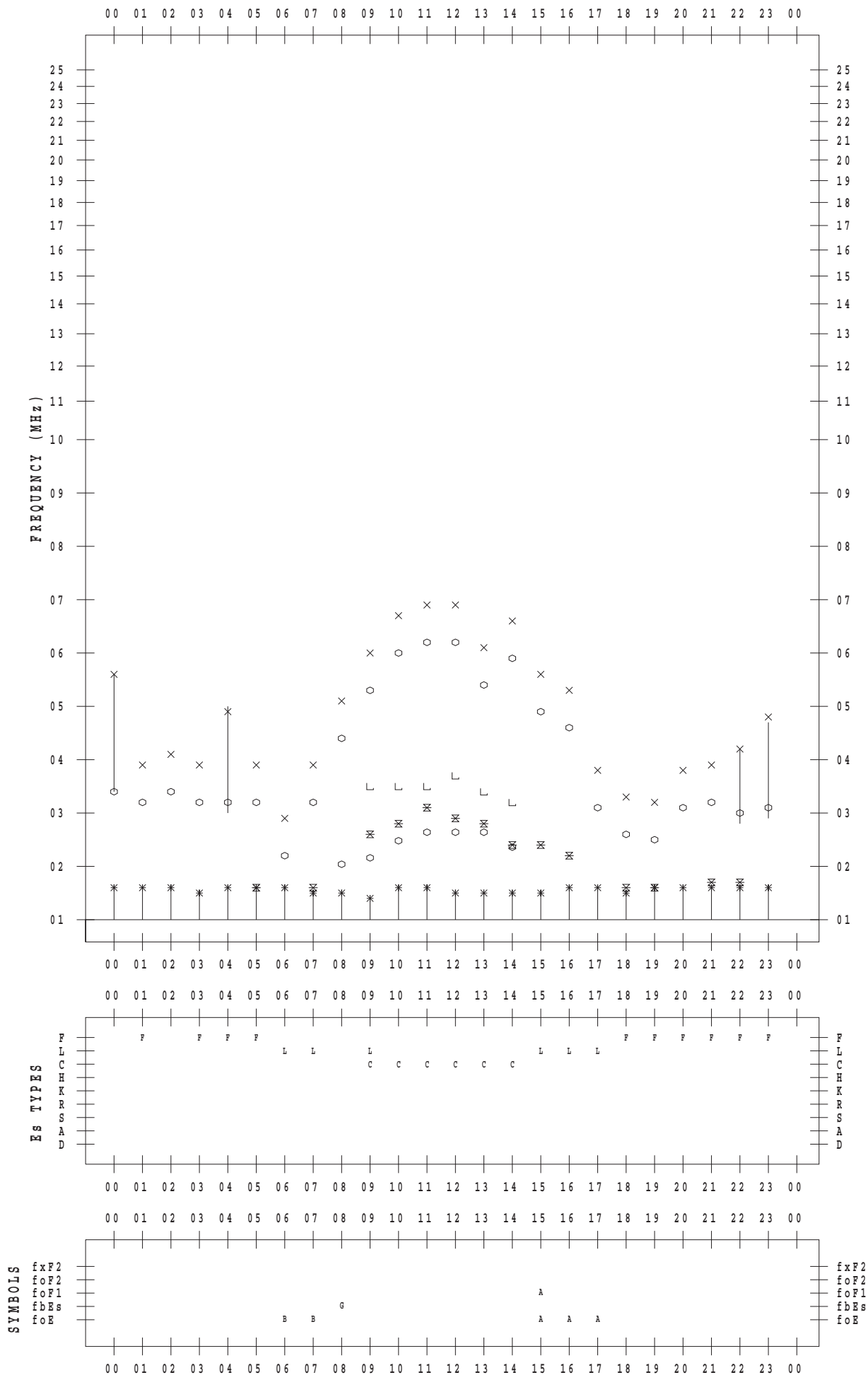
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/26

135 ° E MEAN TIME



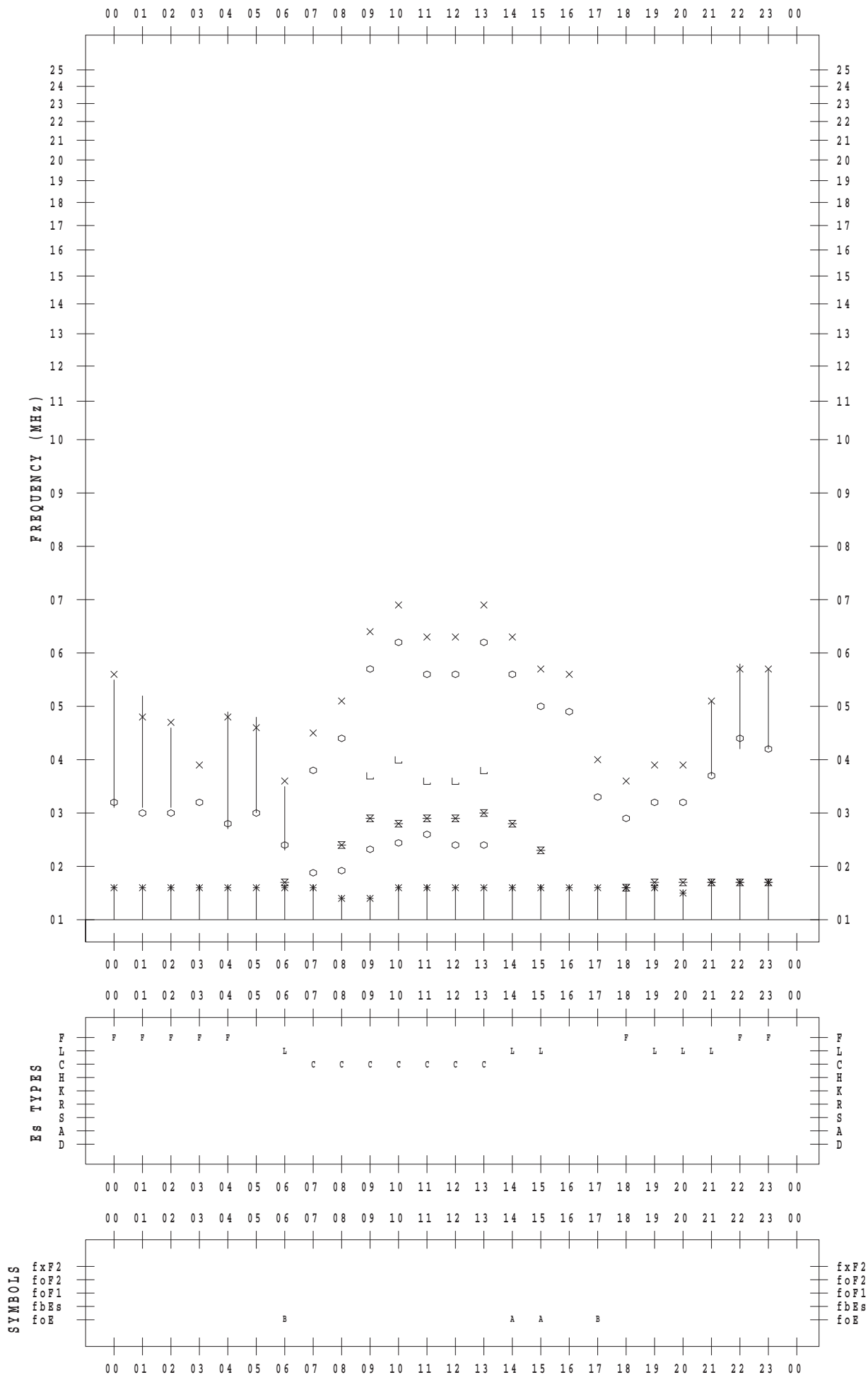
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/27

135 ° E MEAN TIME



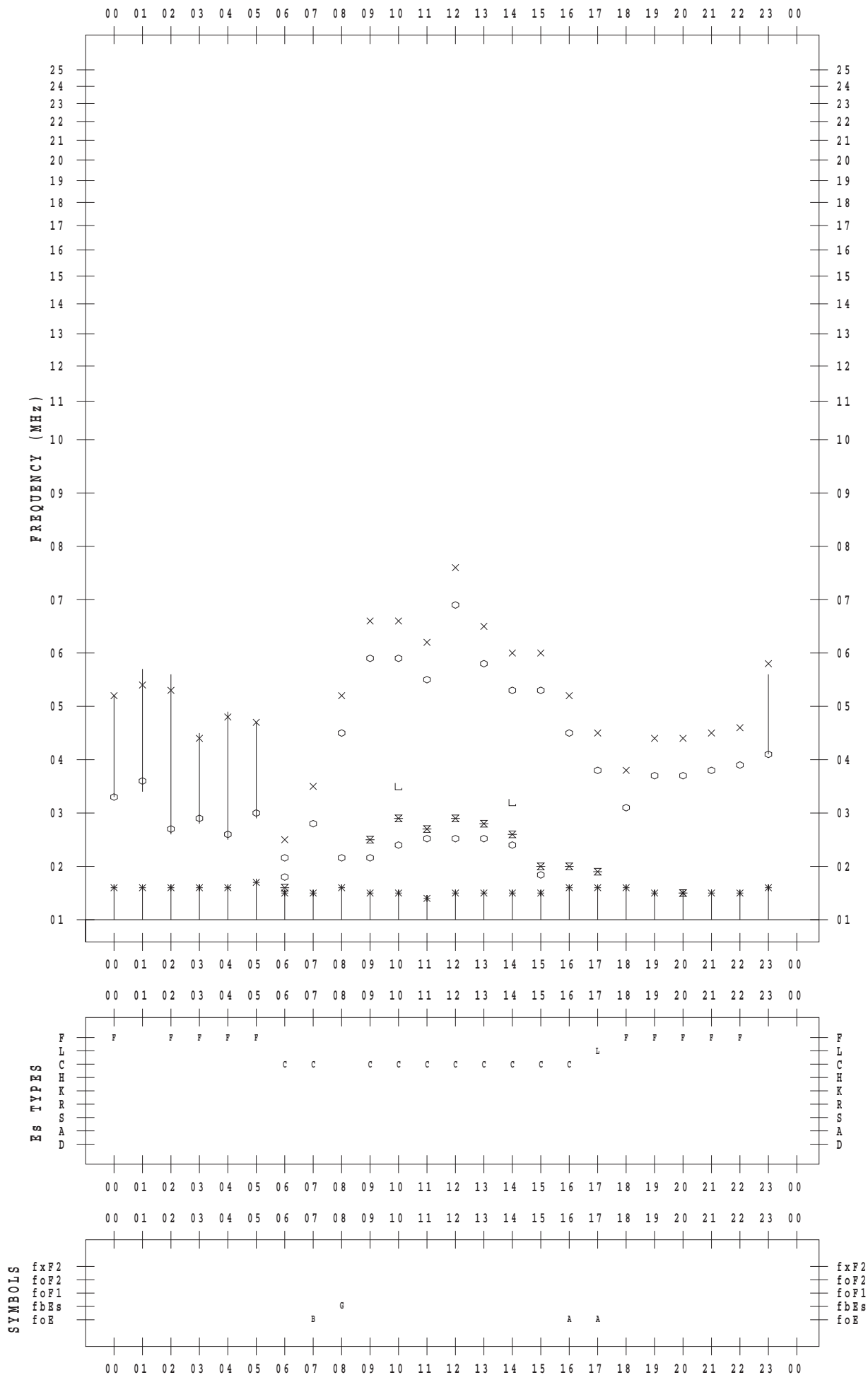
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/28

135 ° E MEAN TIME



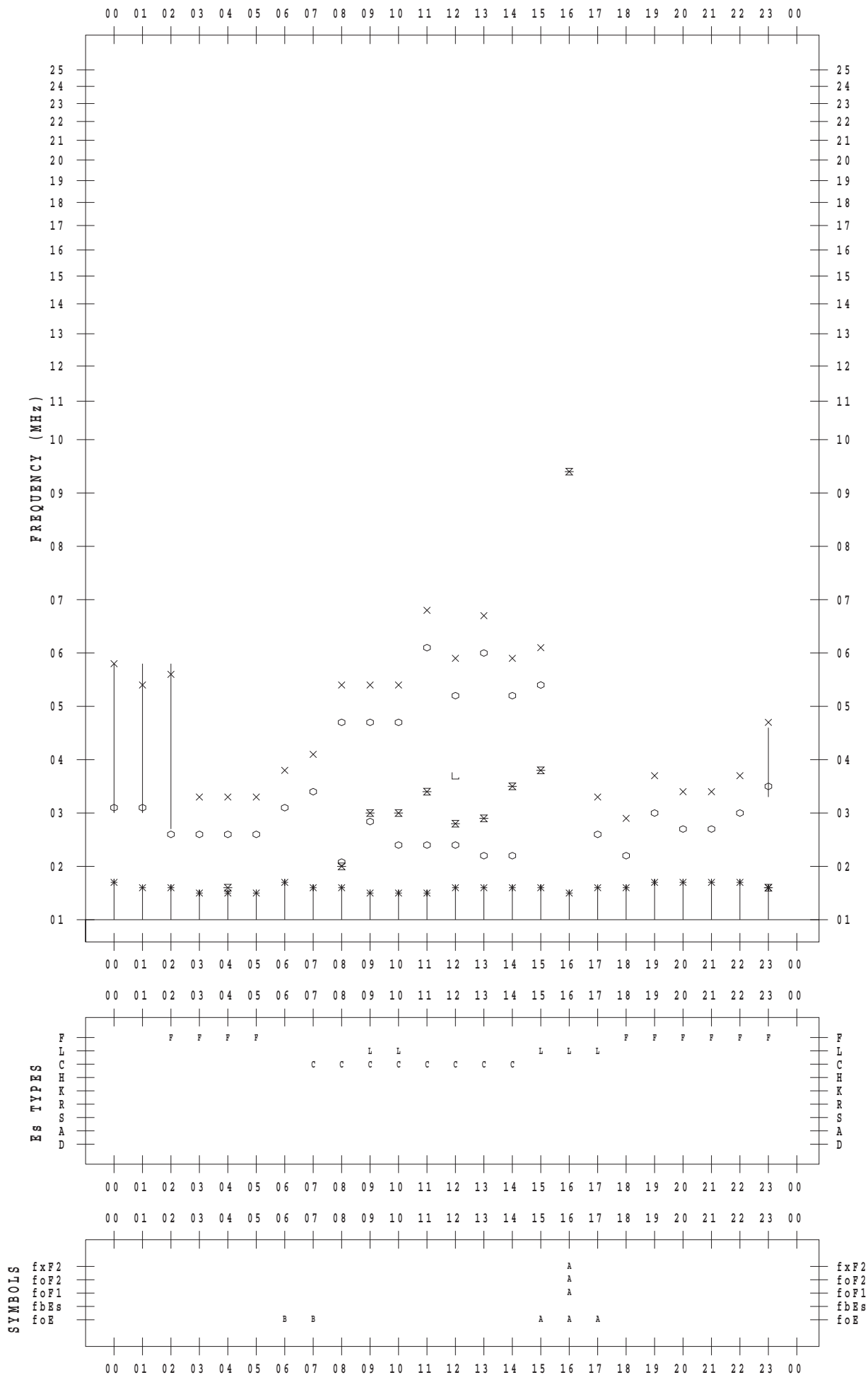
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/29

135 ° E MEAN TIME



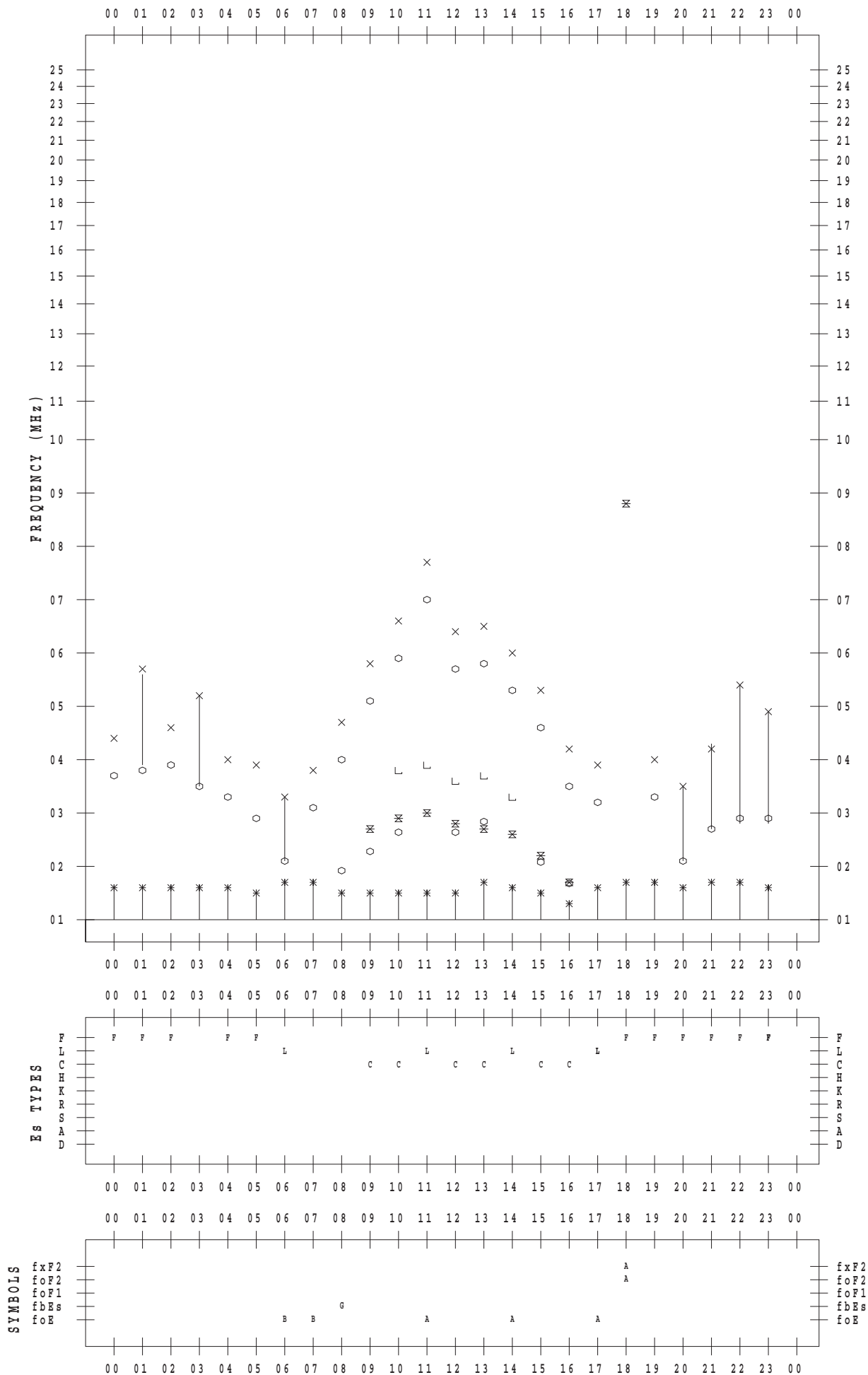
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/30

135 ° E MEAN TIME



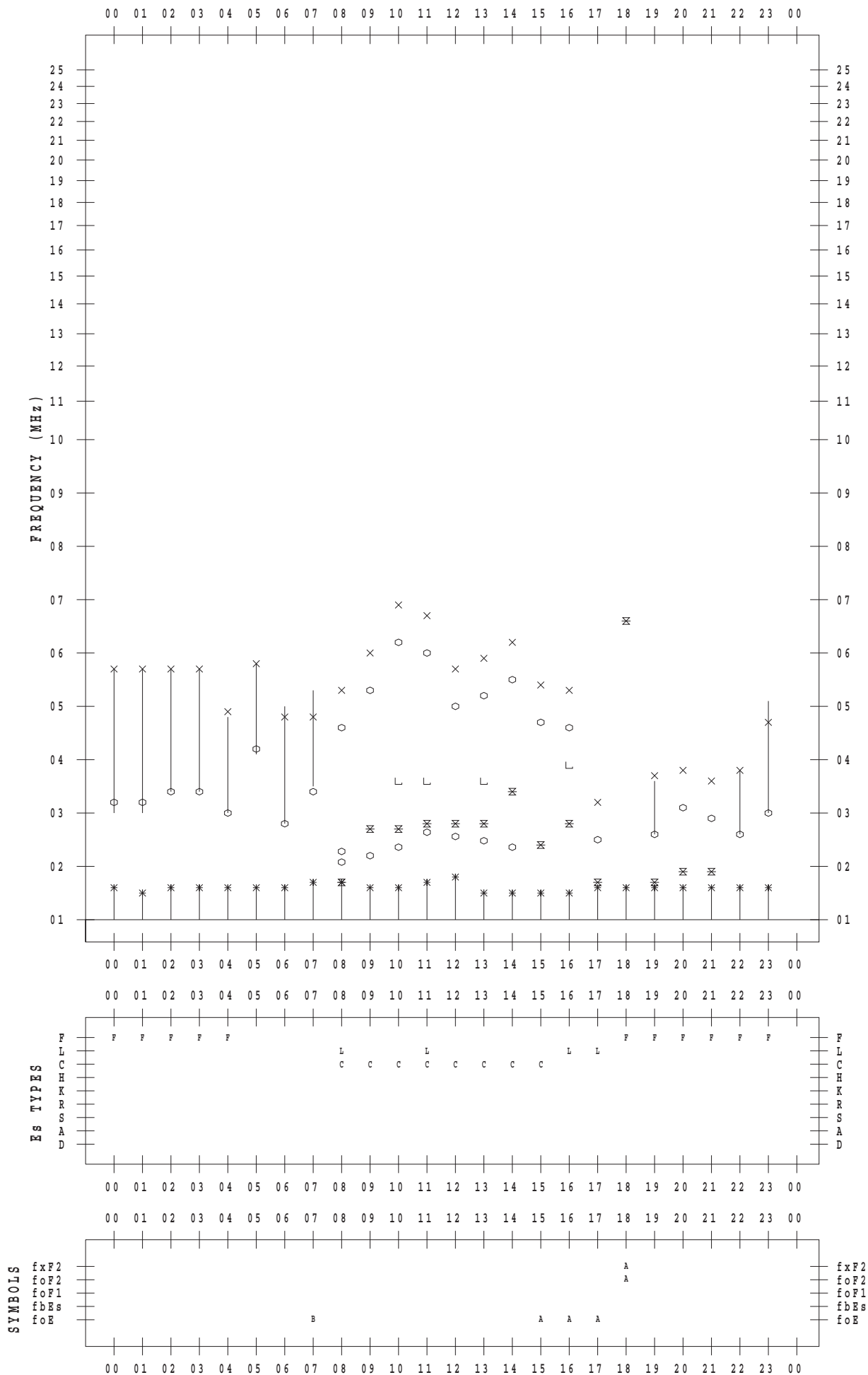
f - PLOT DATA

SCALER : K.FUKUSHIMA

STATION : Wakkanai

DATE : 2017/12/31

135 ° E MEAN TIME



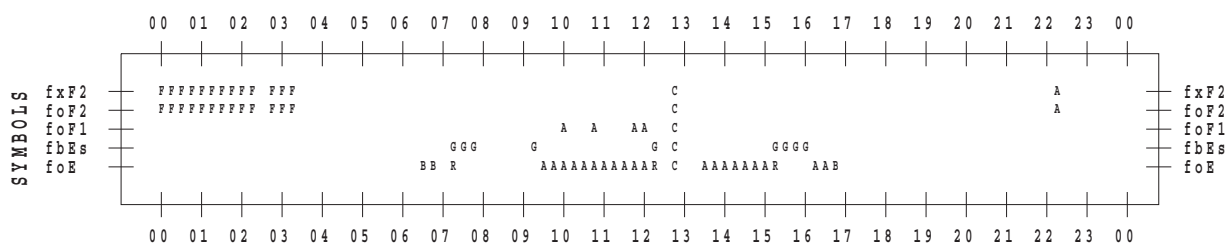
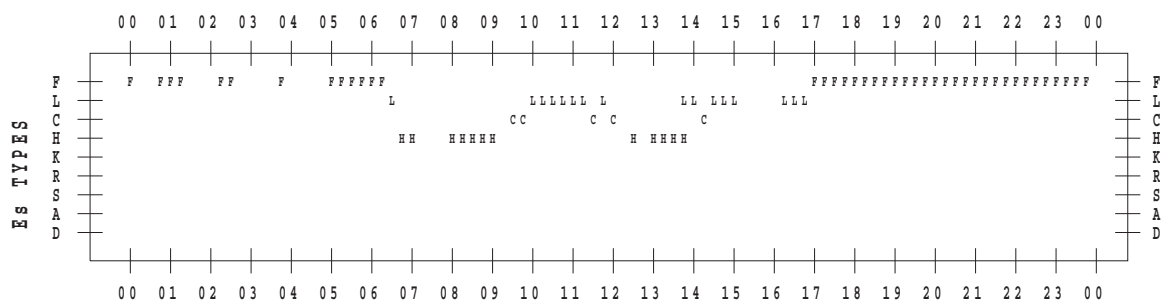
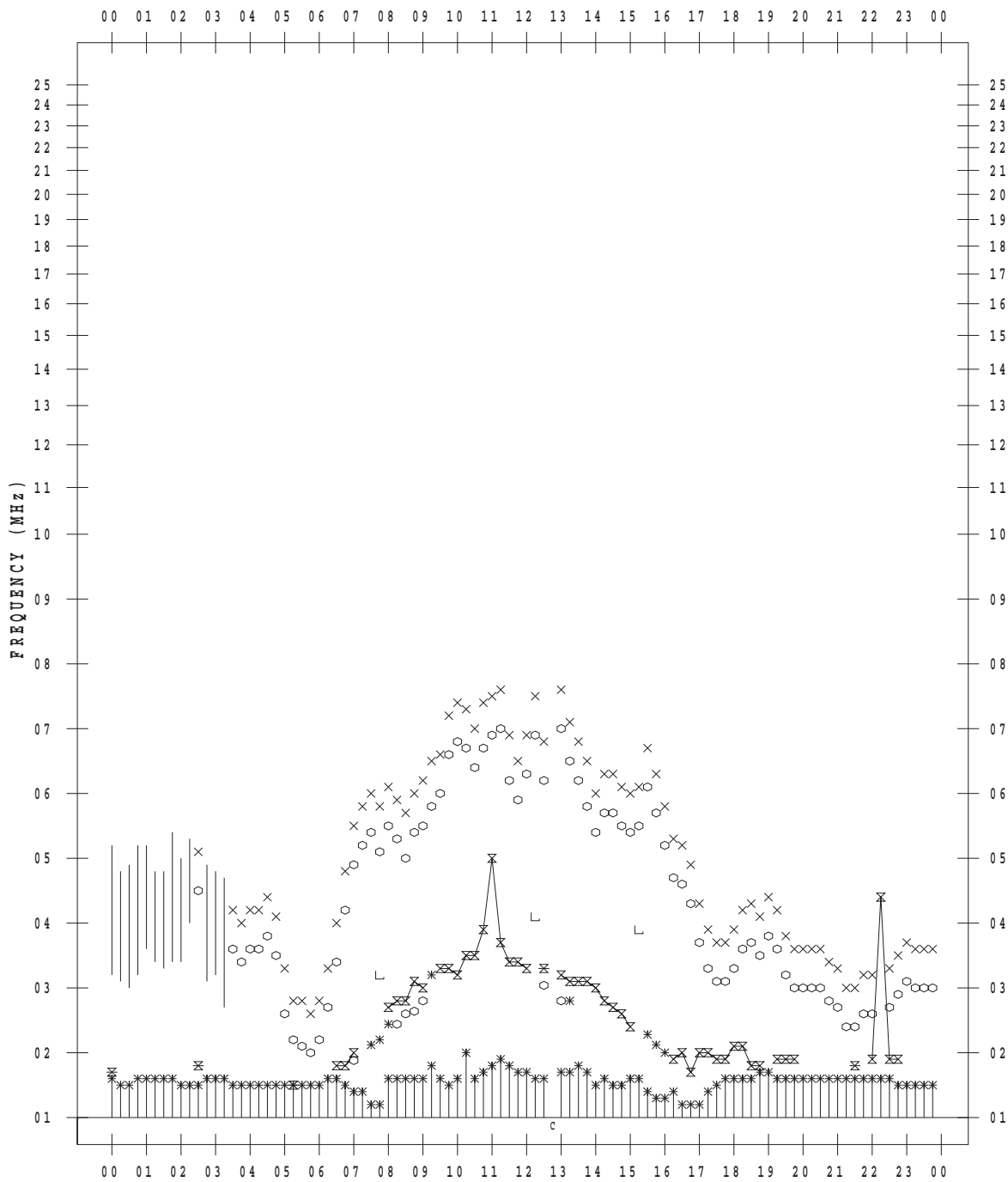
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 1

135 ° E MEAN TIME



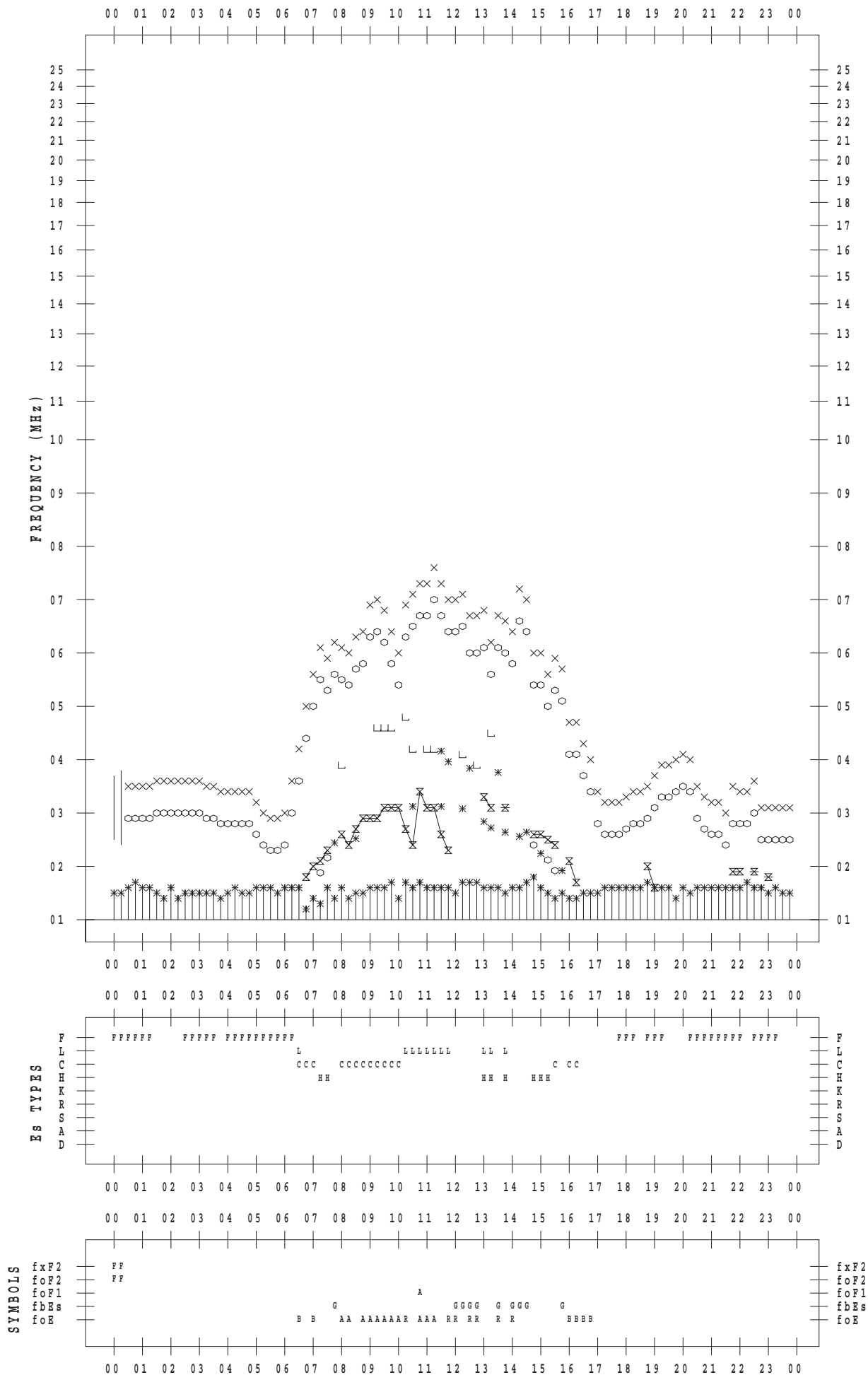
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 2

135 ° E MEAN TIME



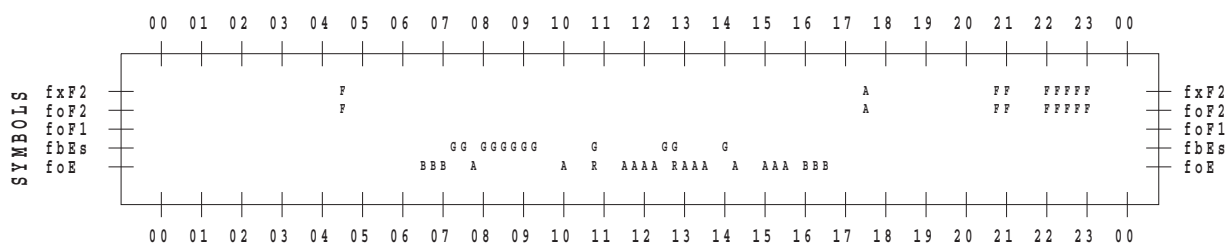
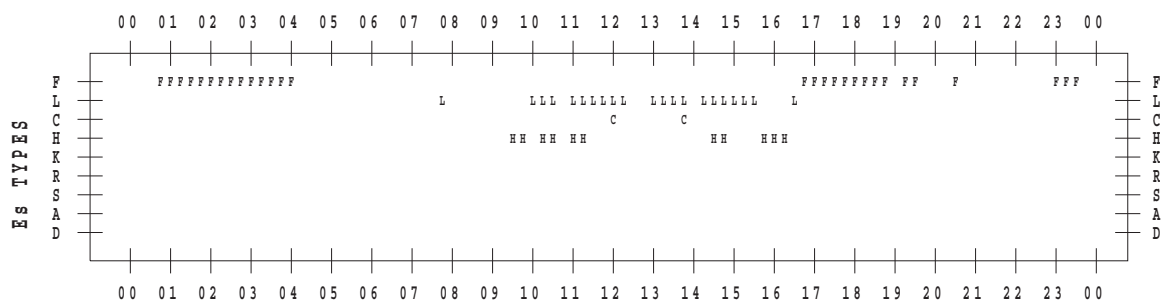
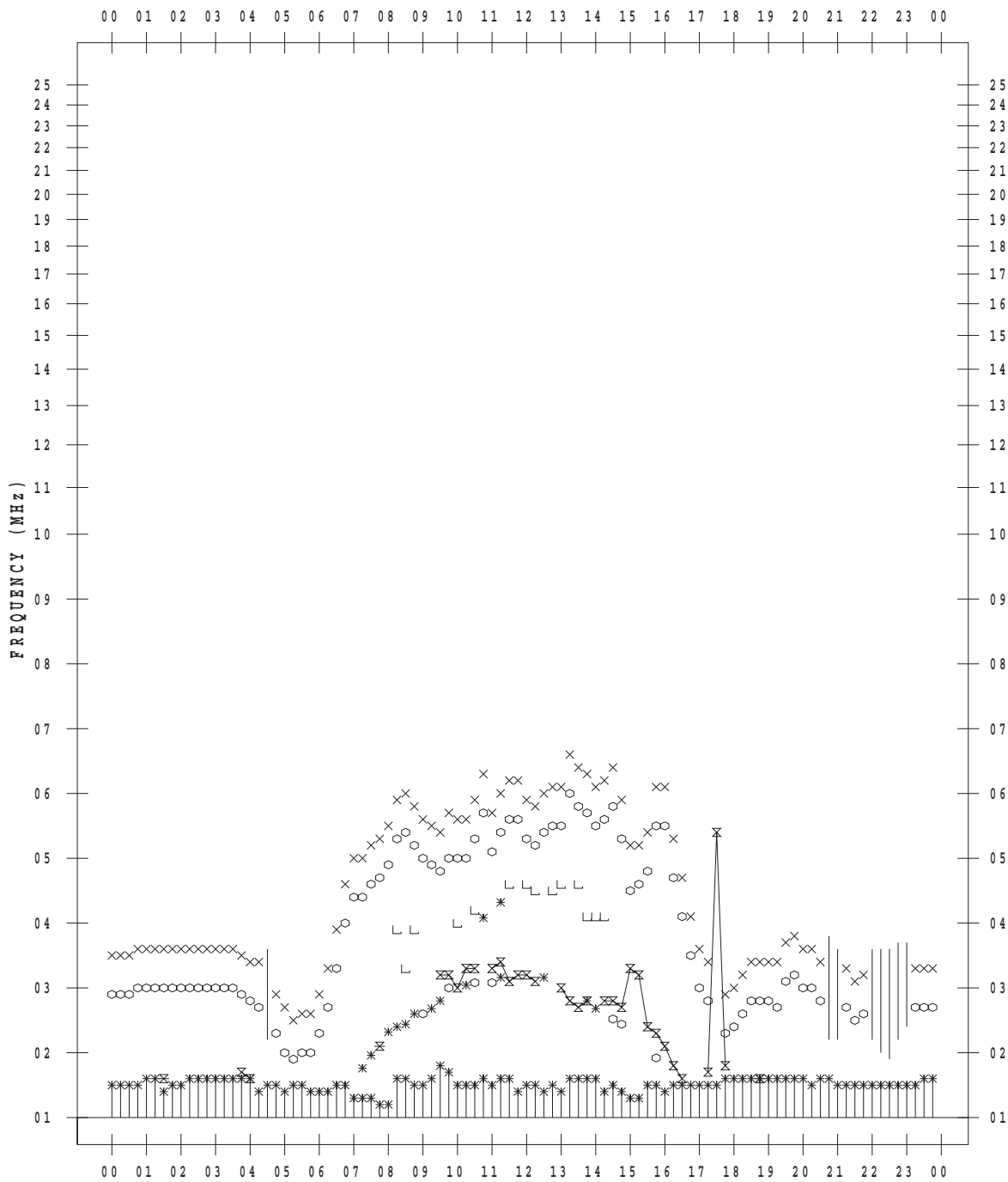
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 4

135 ° E MEAN TIME



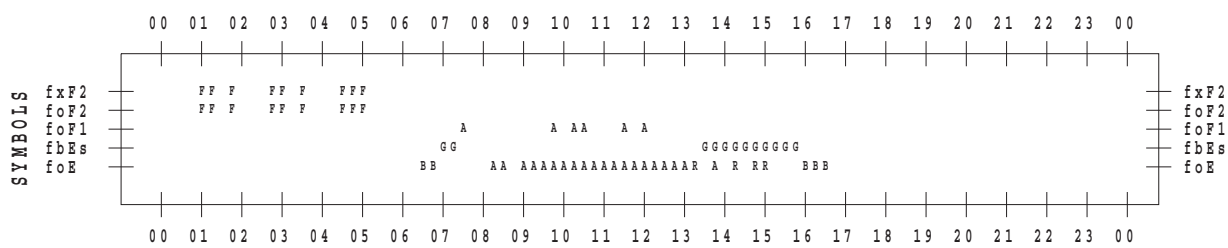
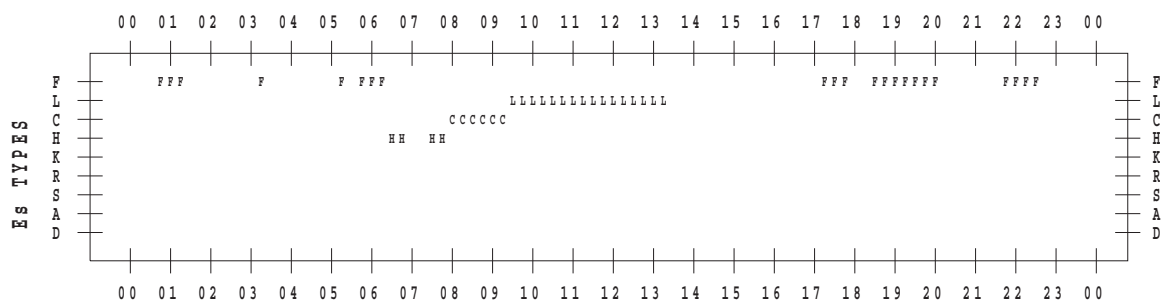
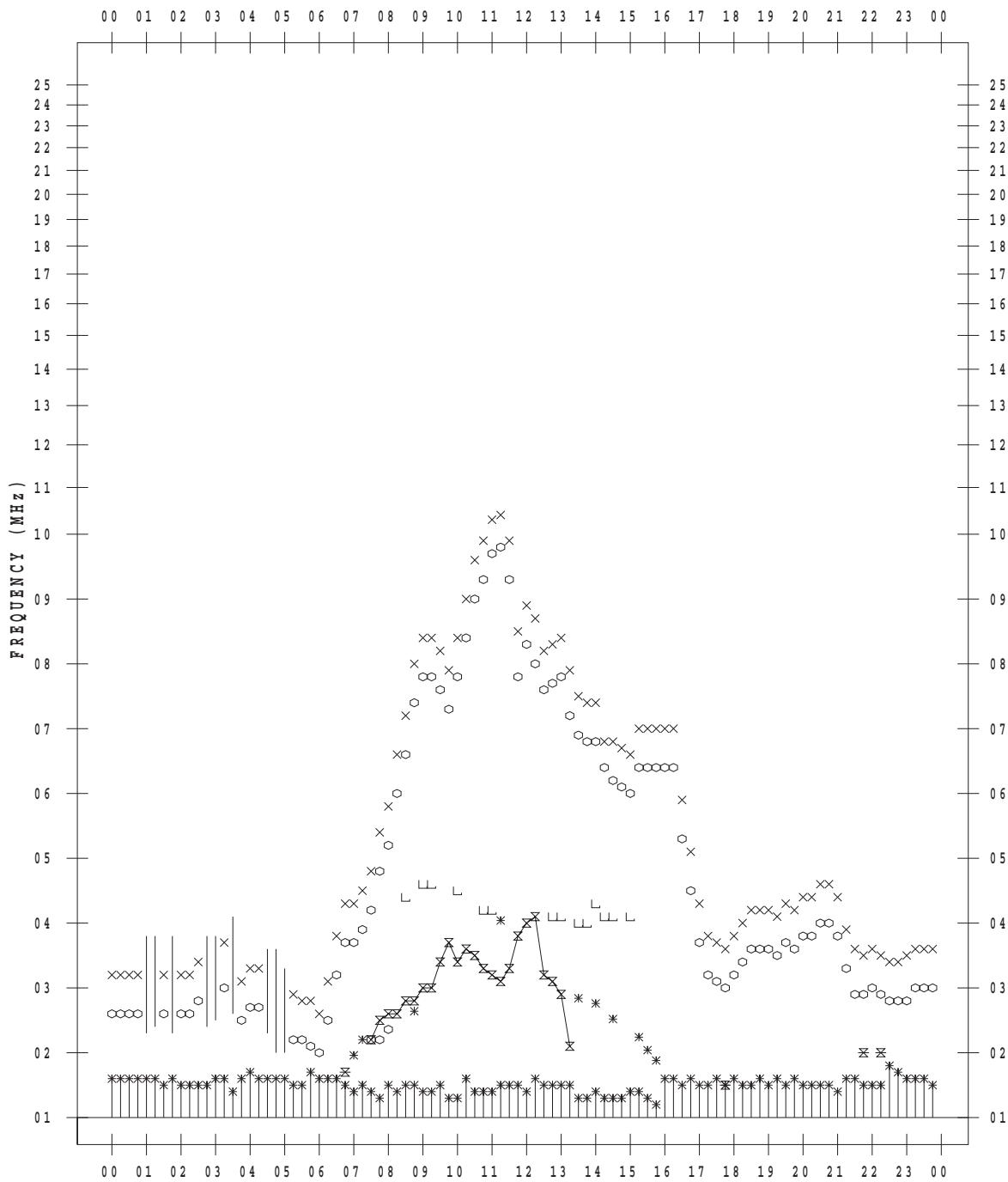
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SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 5

135 ° E MEAN TIME



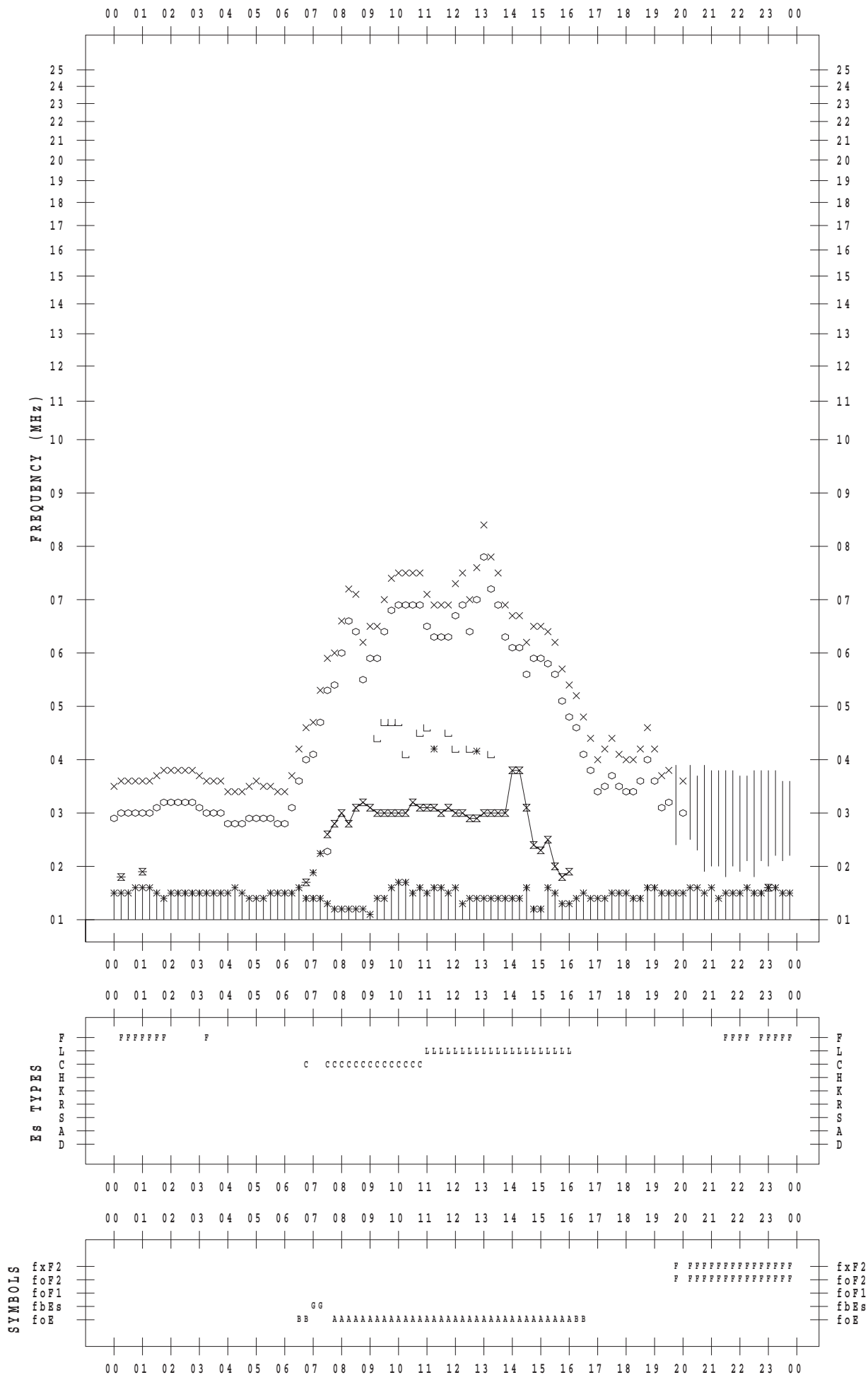
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 6

135 ° E MEAN TIME



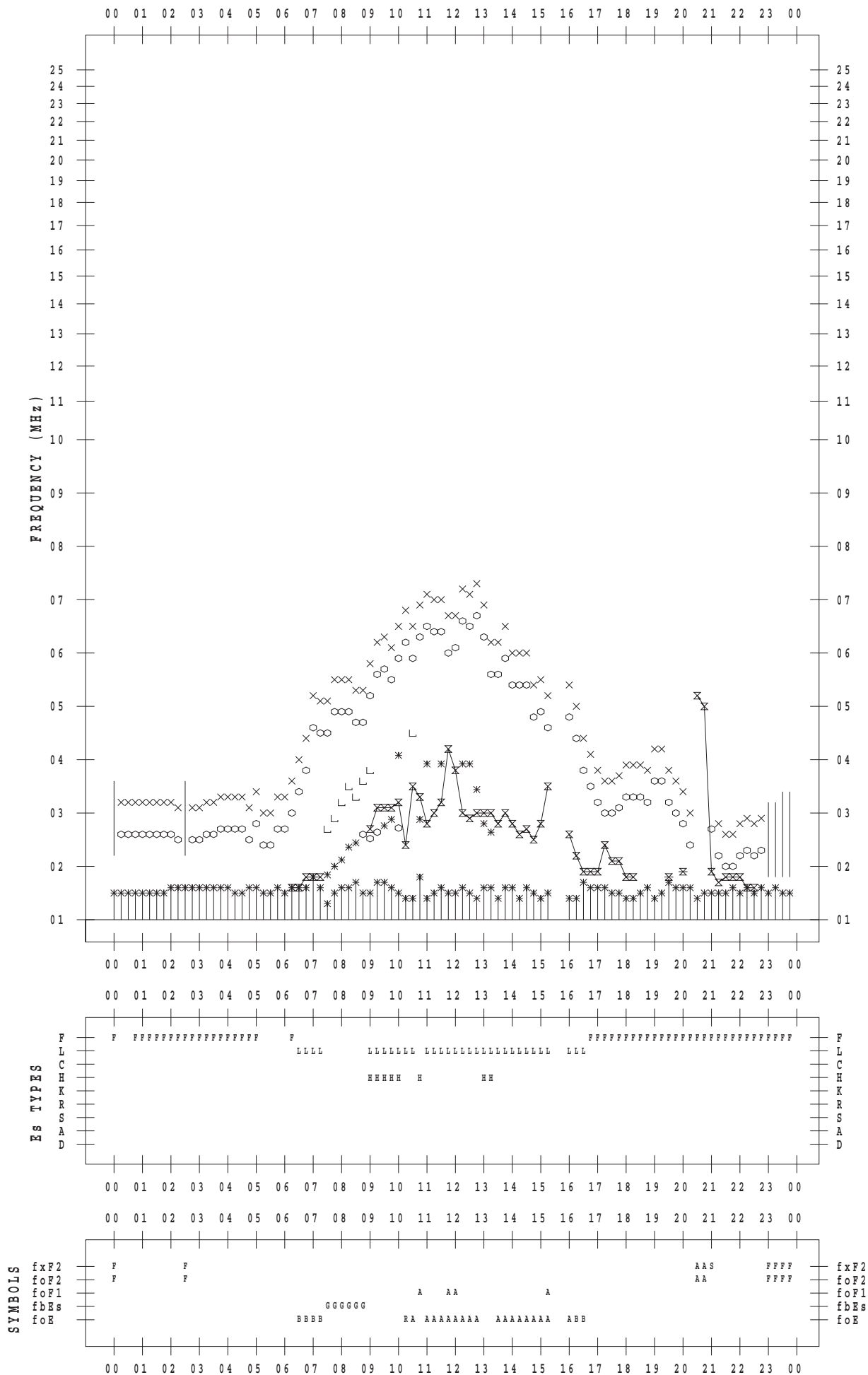
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 7

135 ° E MEAN TIME



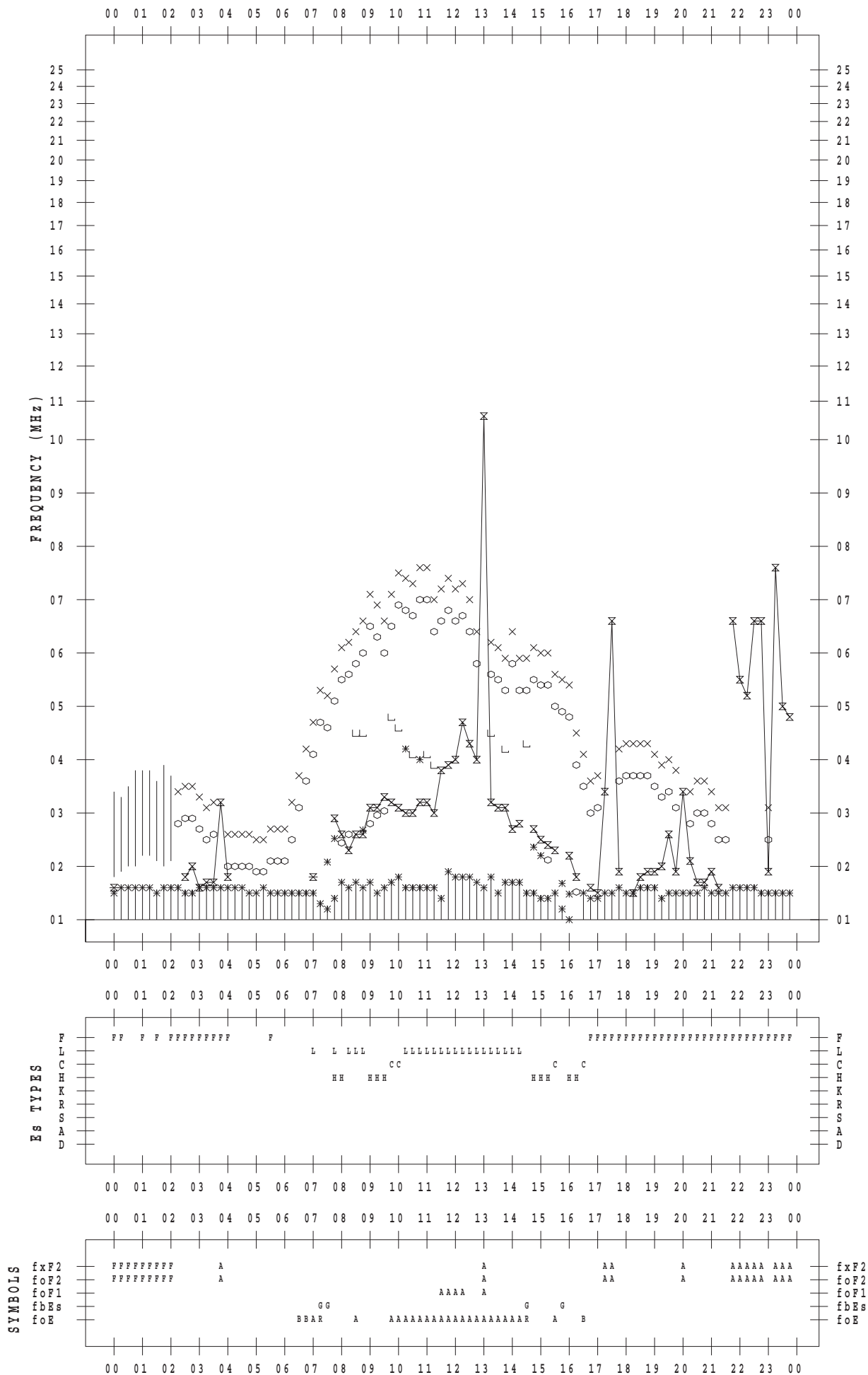
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 8

135 ° E MEAN TIME



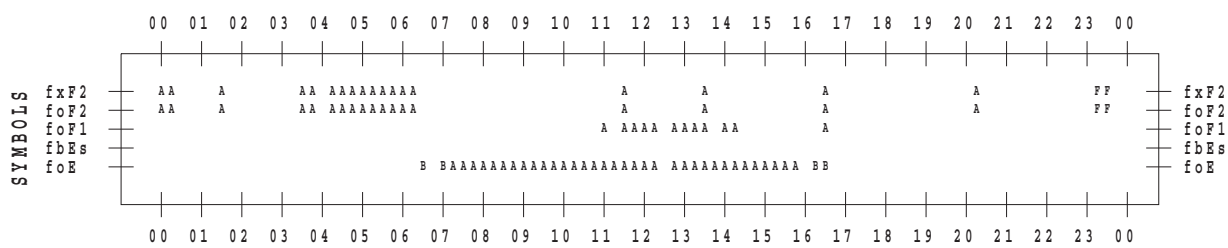
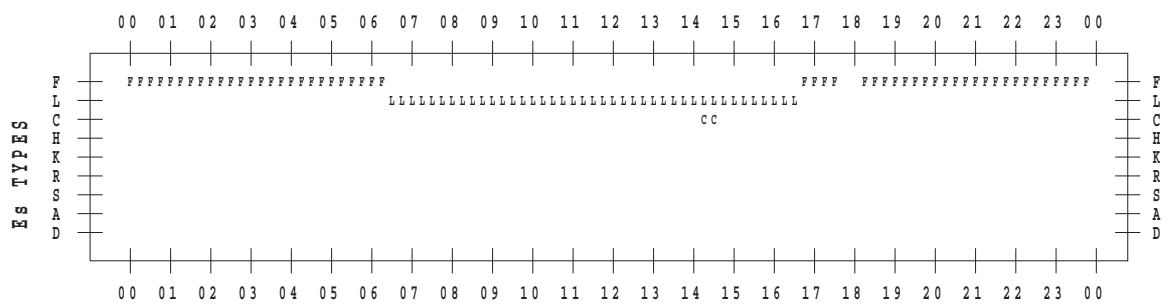
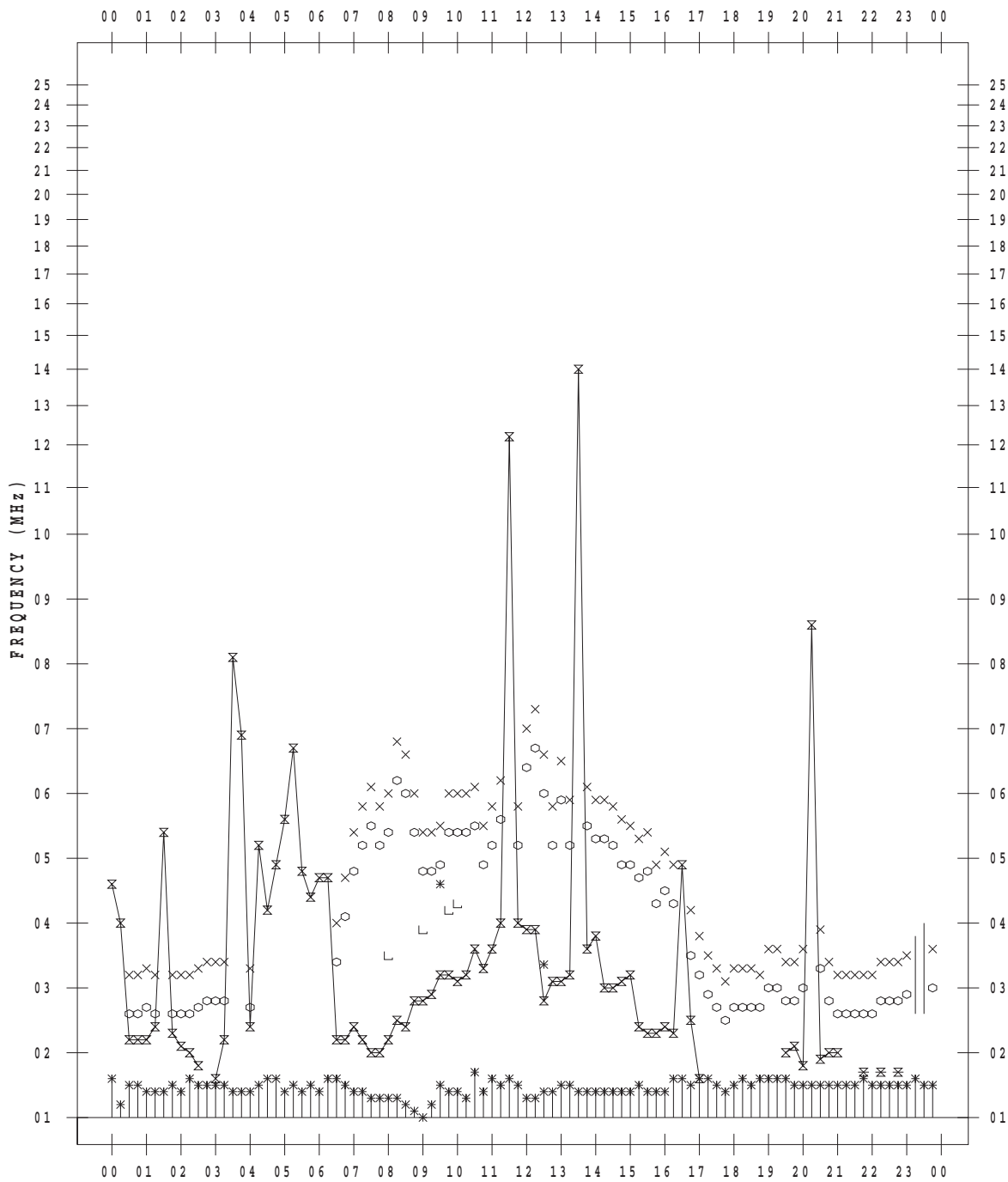
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/ 9

135 ° E MEAN TIME



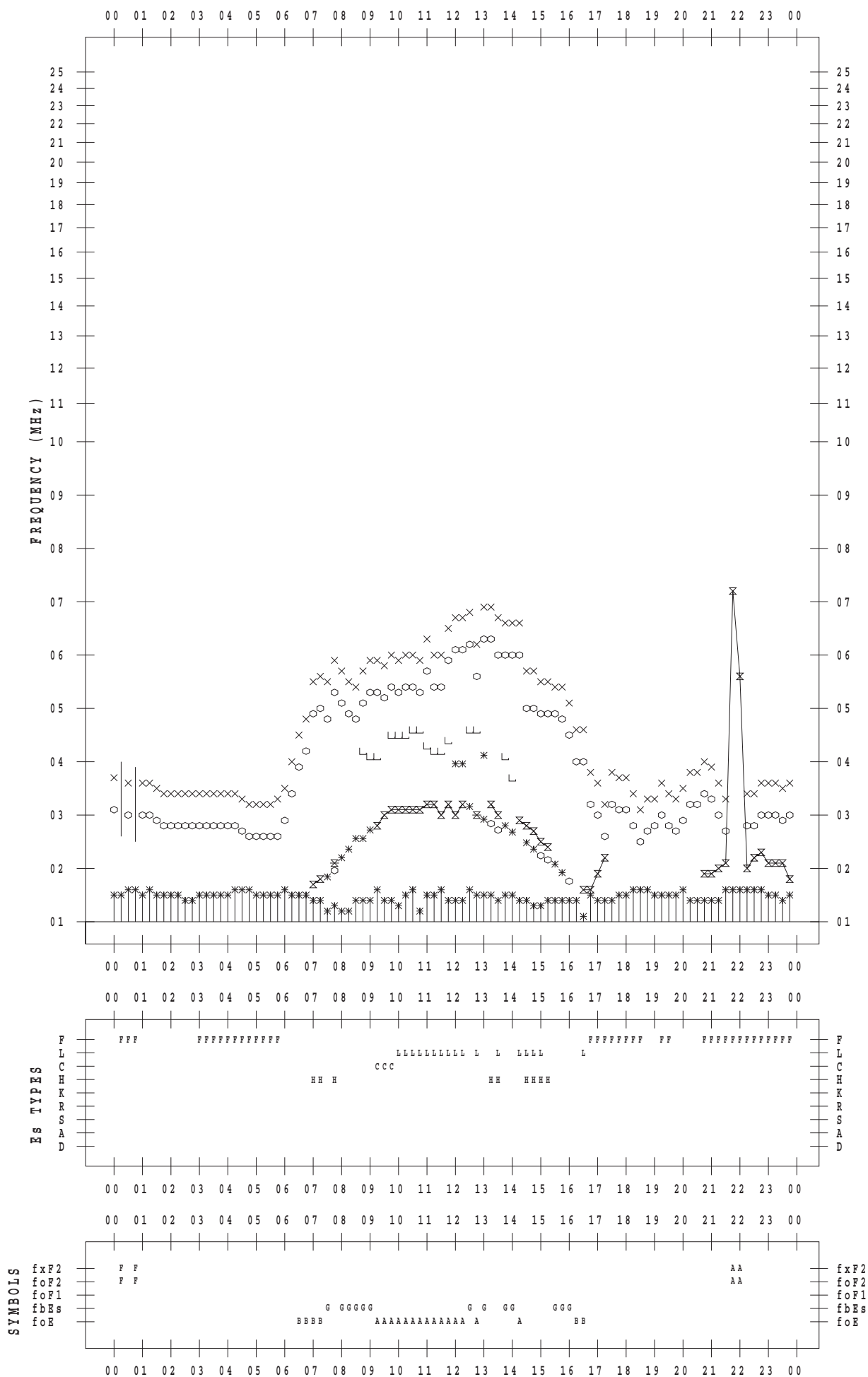
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/10

135 ° E MEAN TIME



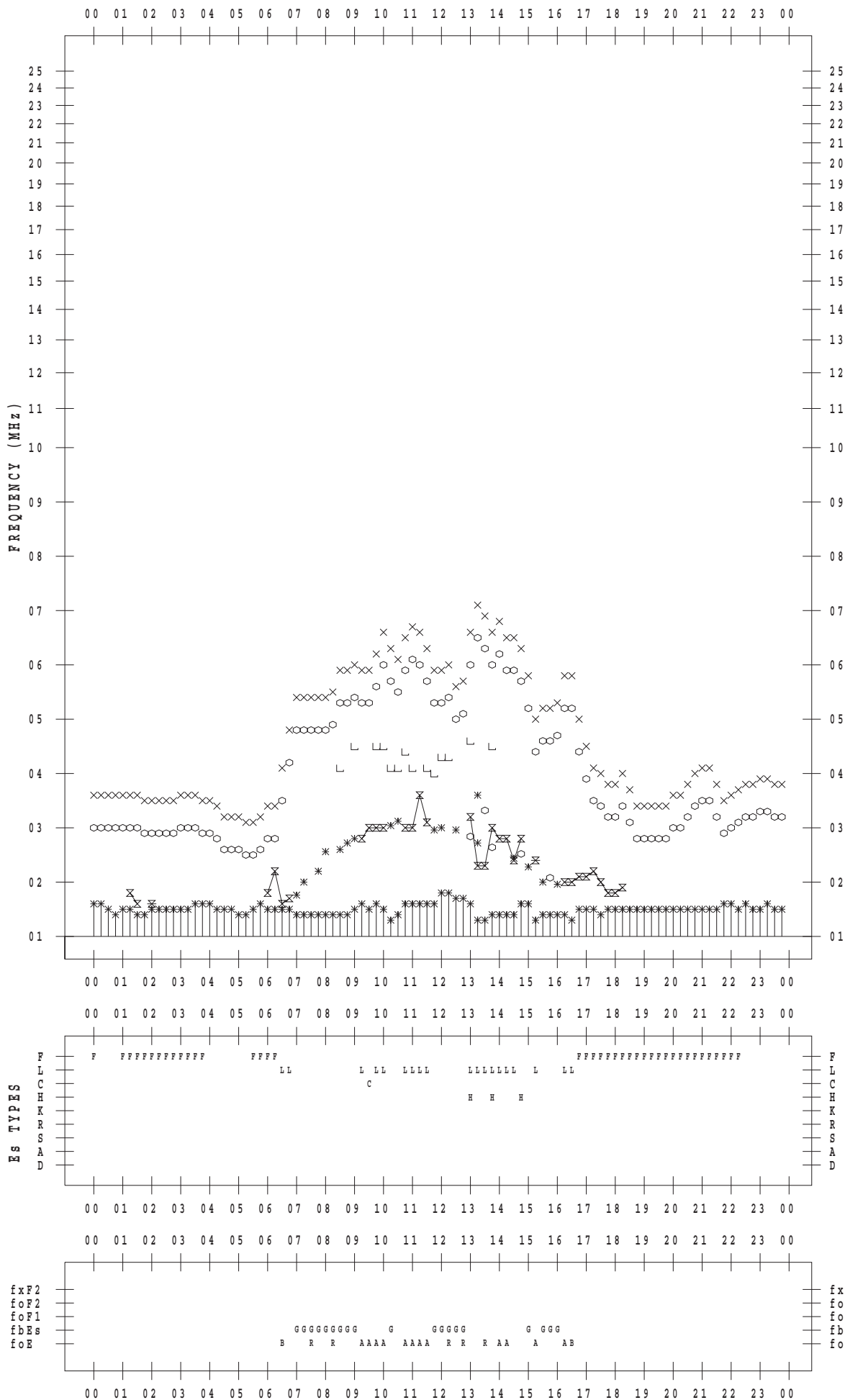
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/11

135 ° E MEAN TIME



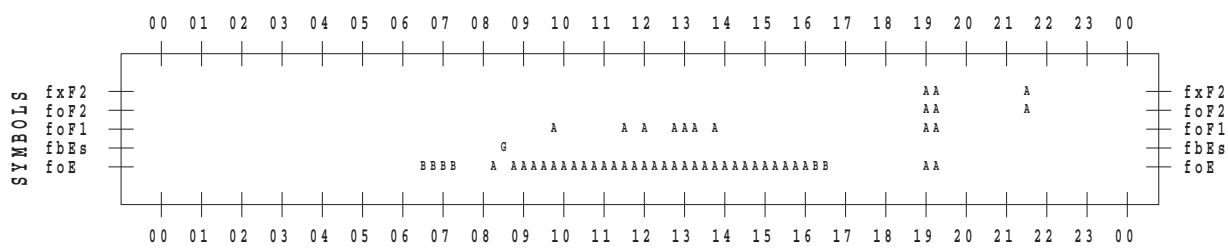
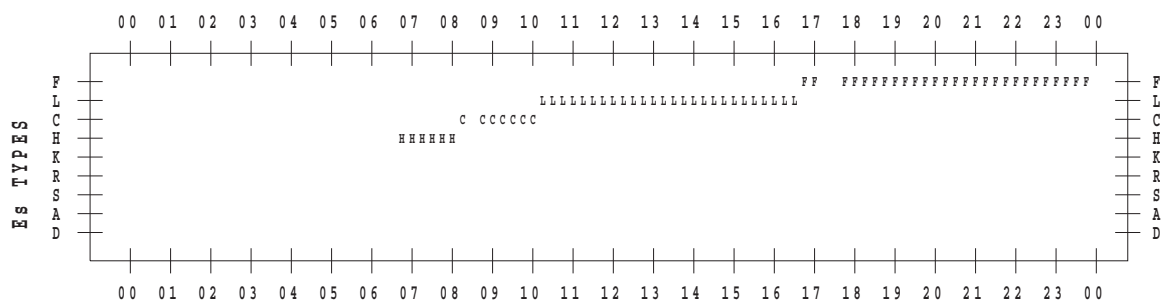
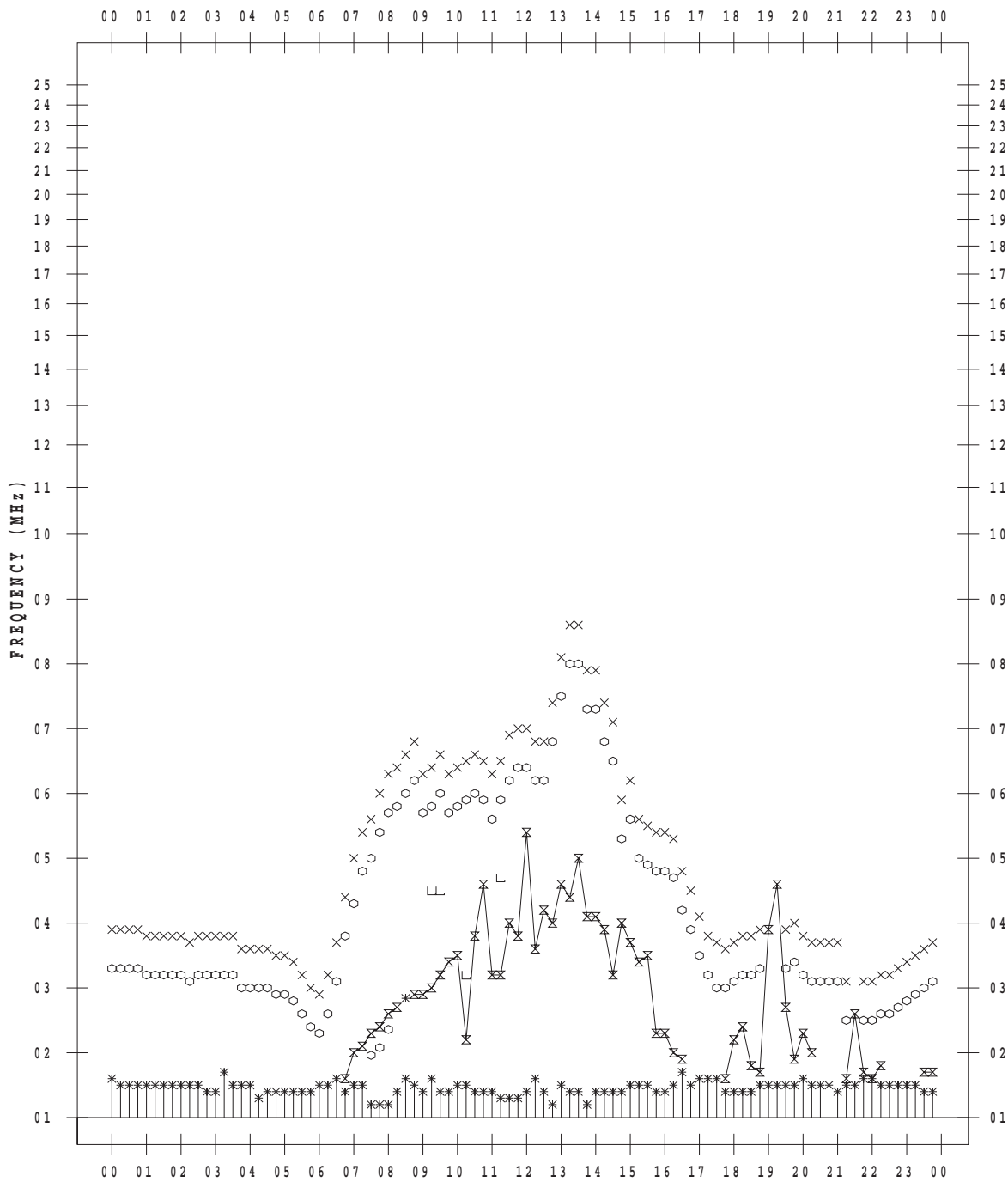
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/12

135 ° E MEAN TIME



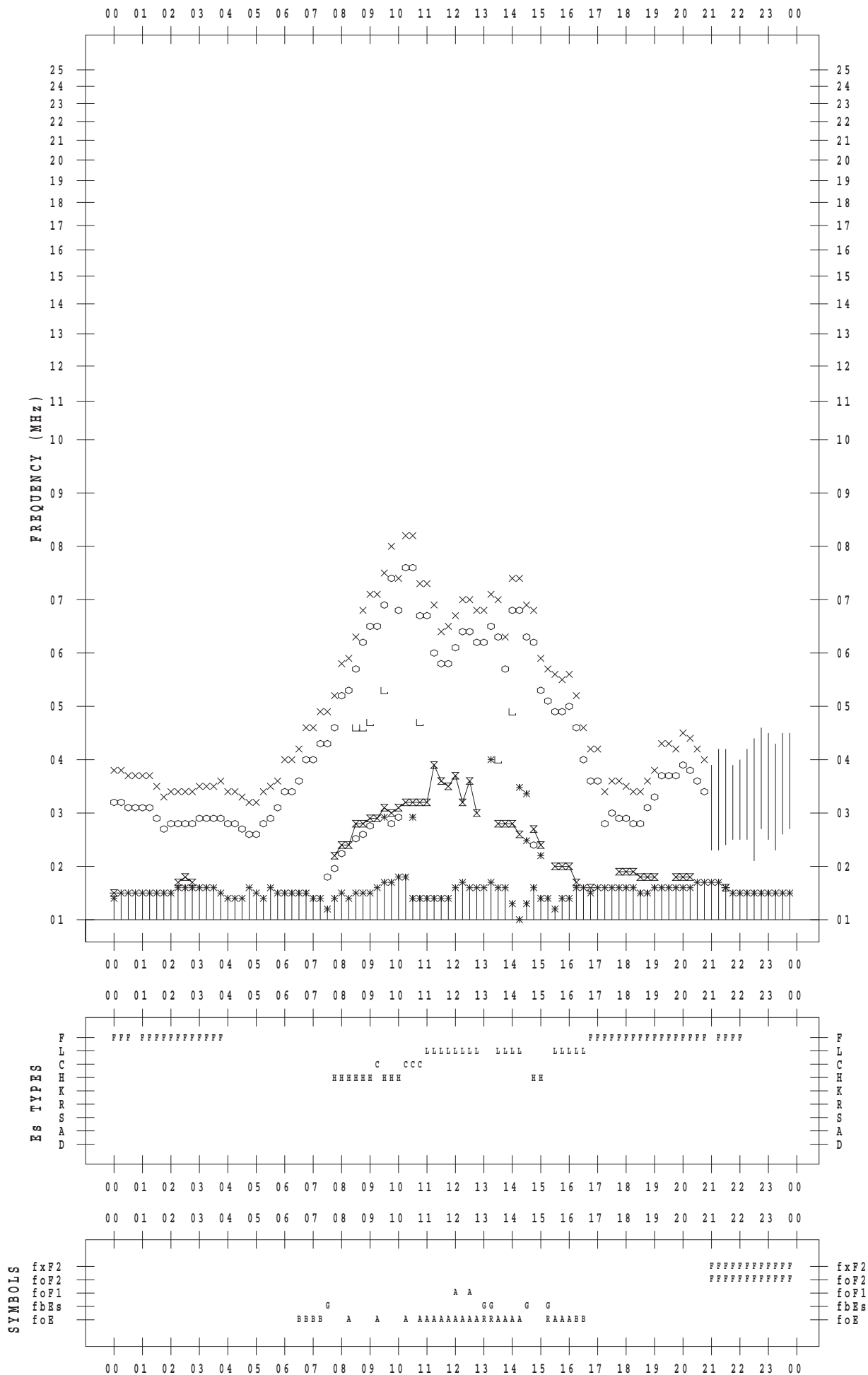
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/13

135 ° E MEAN TIME



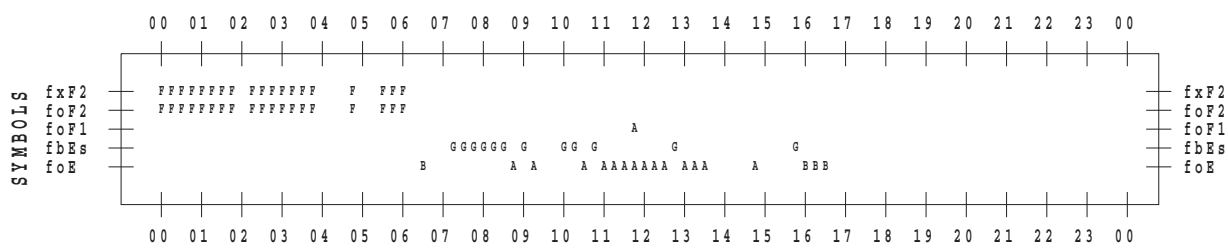
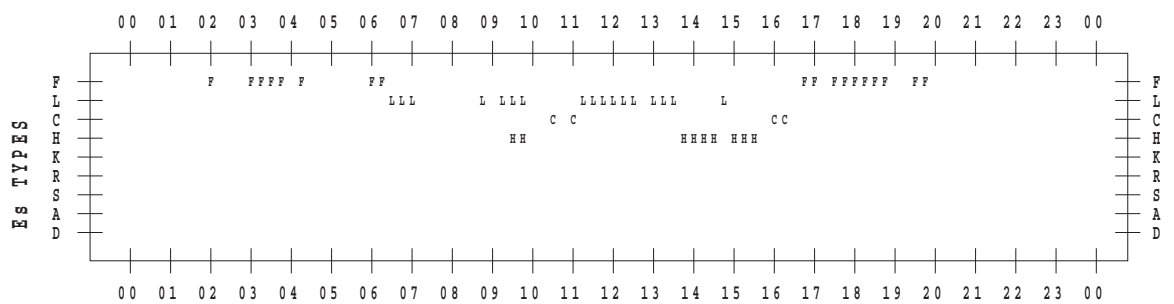
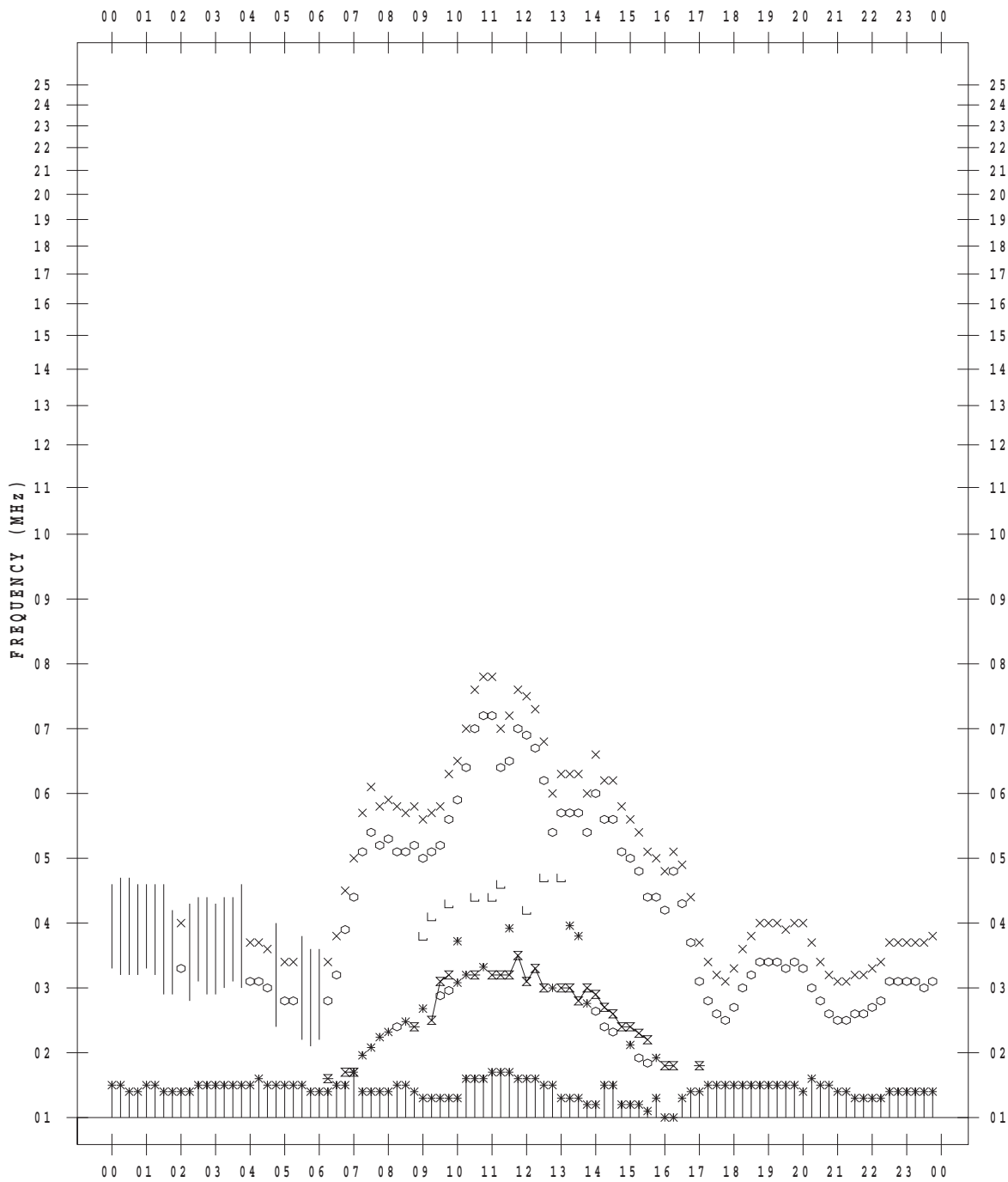
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/14

135 ° E MEAN TIME



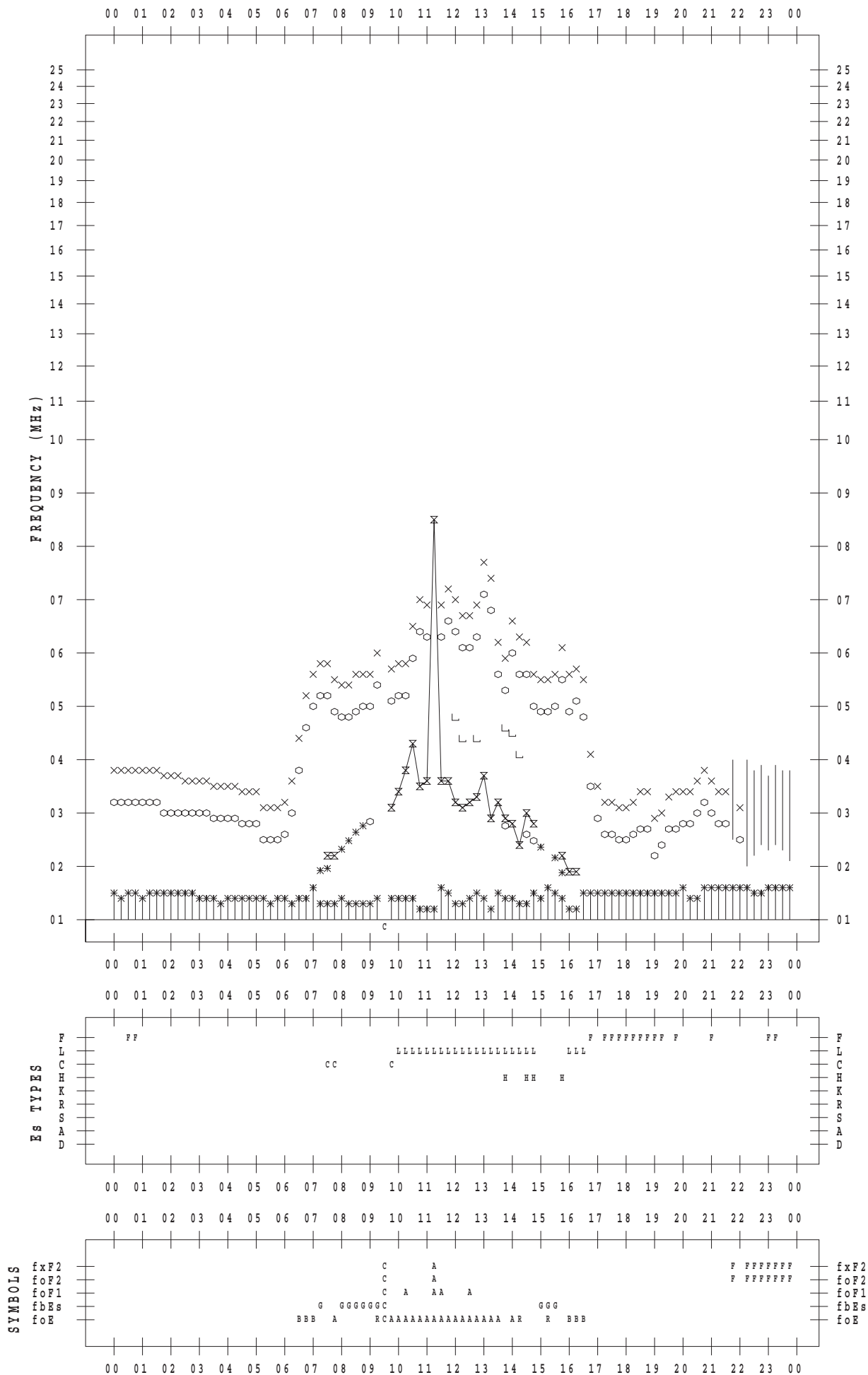
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/15

135 ° E MEAN TIME



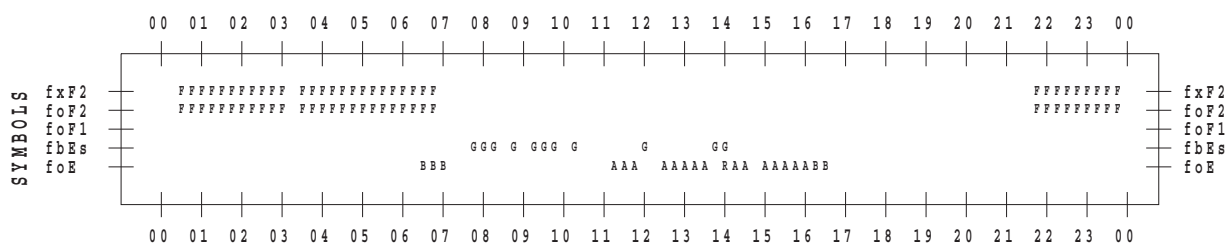
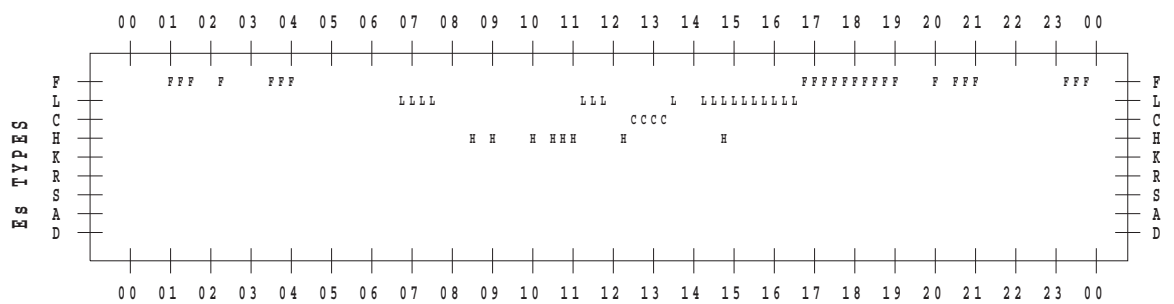
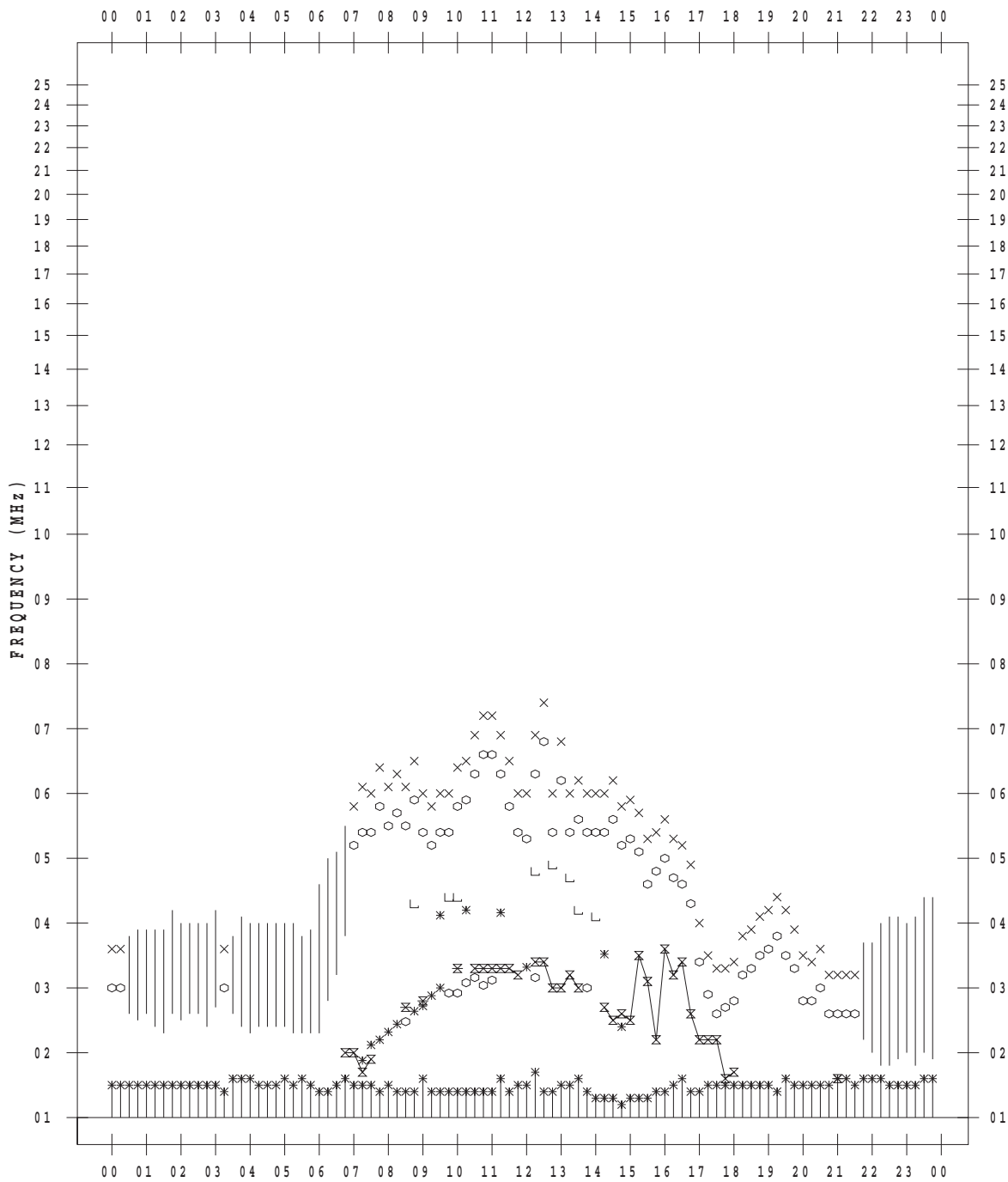
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/16

135 ° E MEAN TIME



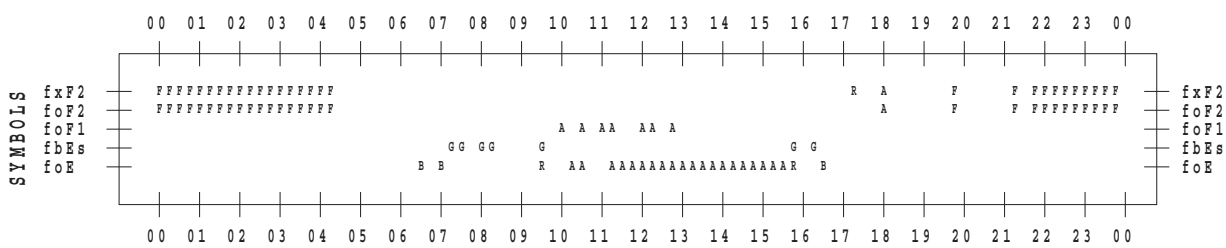
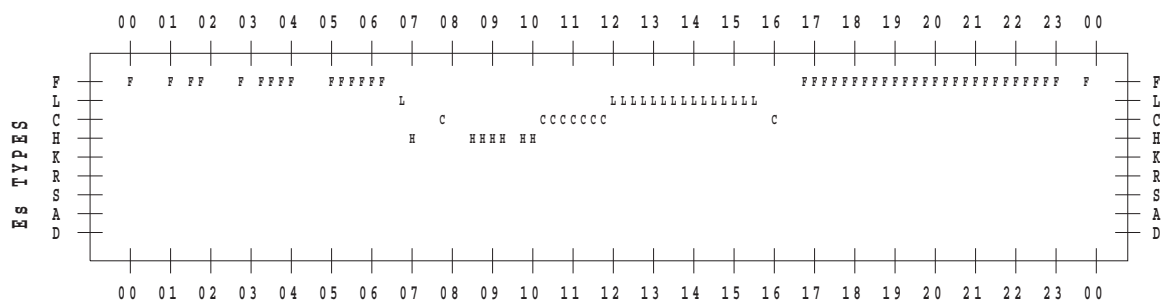
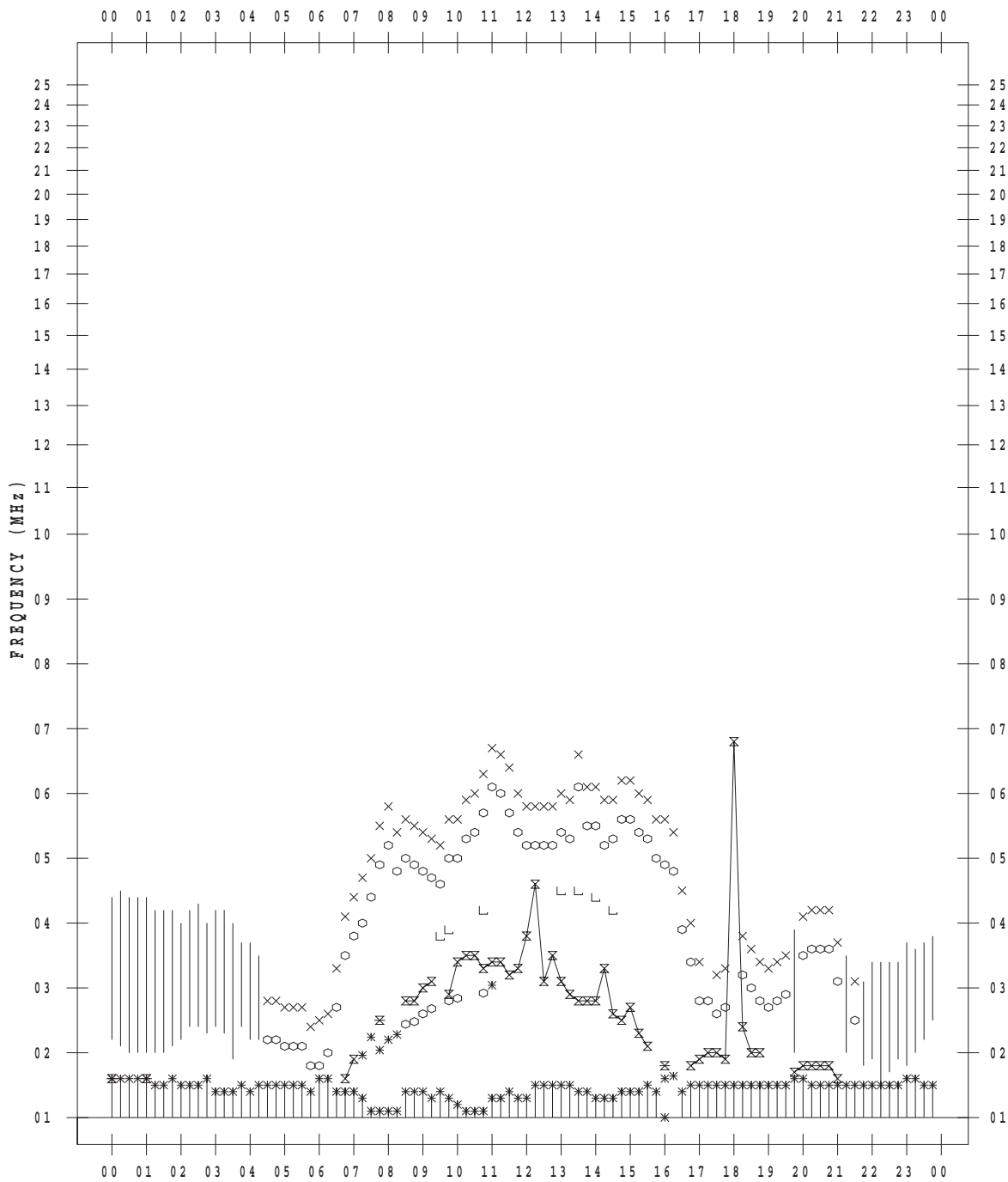
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/17

135 ° E MEAN TIME



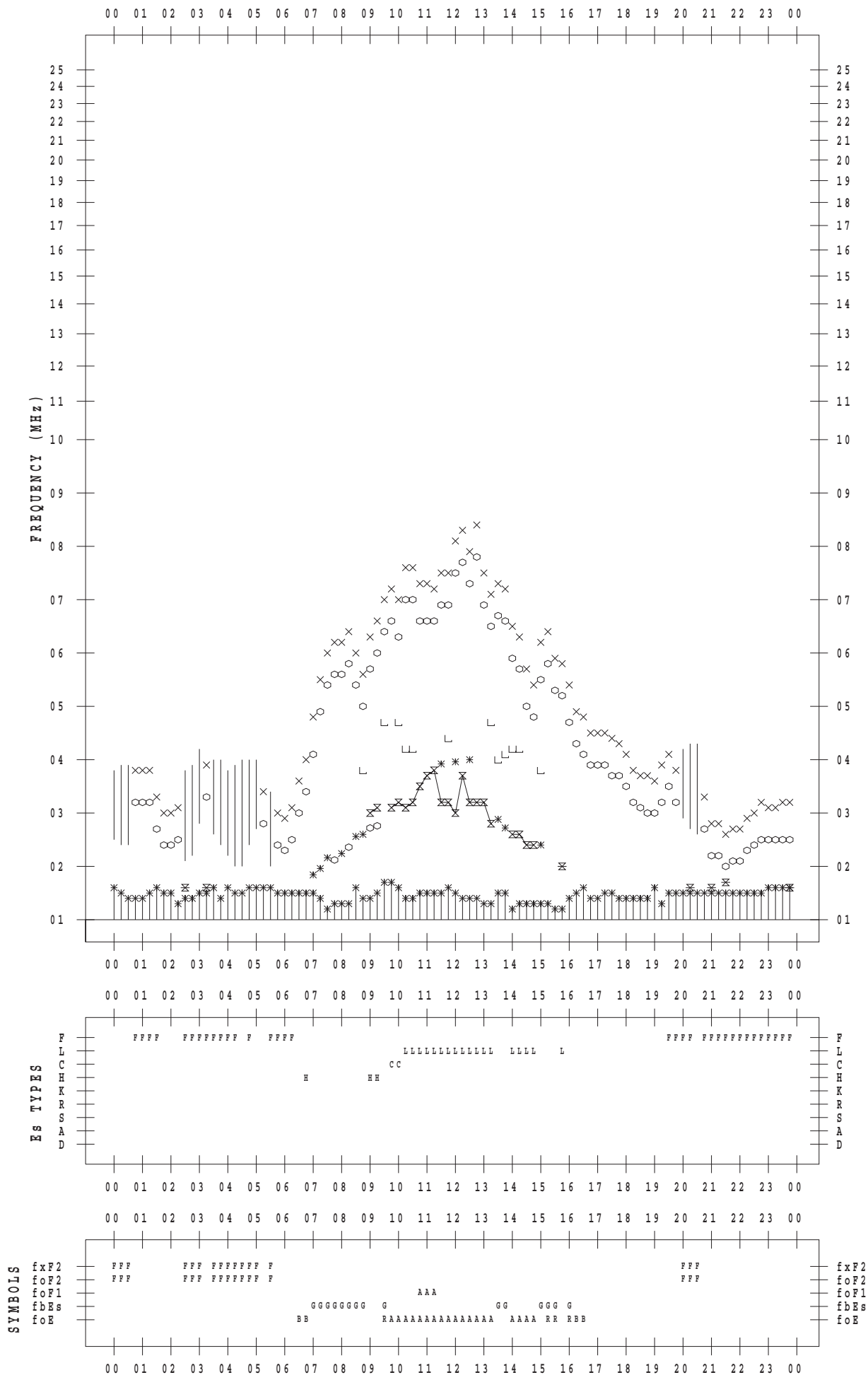
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/18

135 ° E MEAN TIME



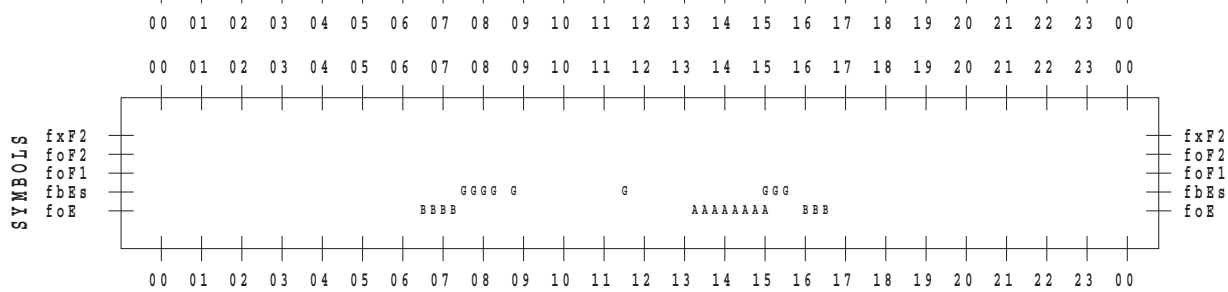
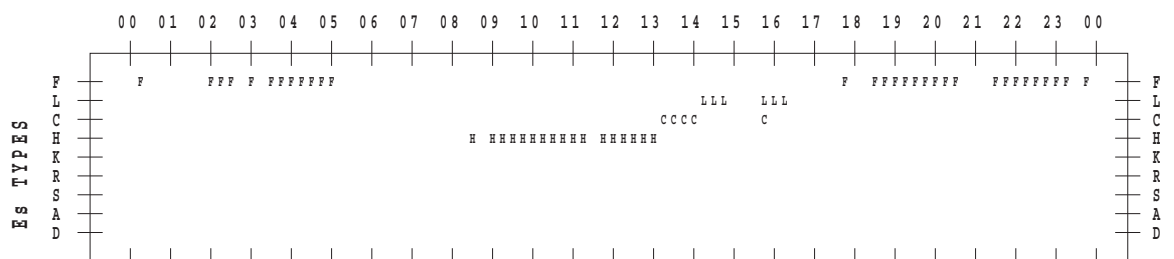
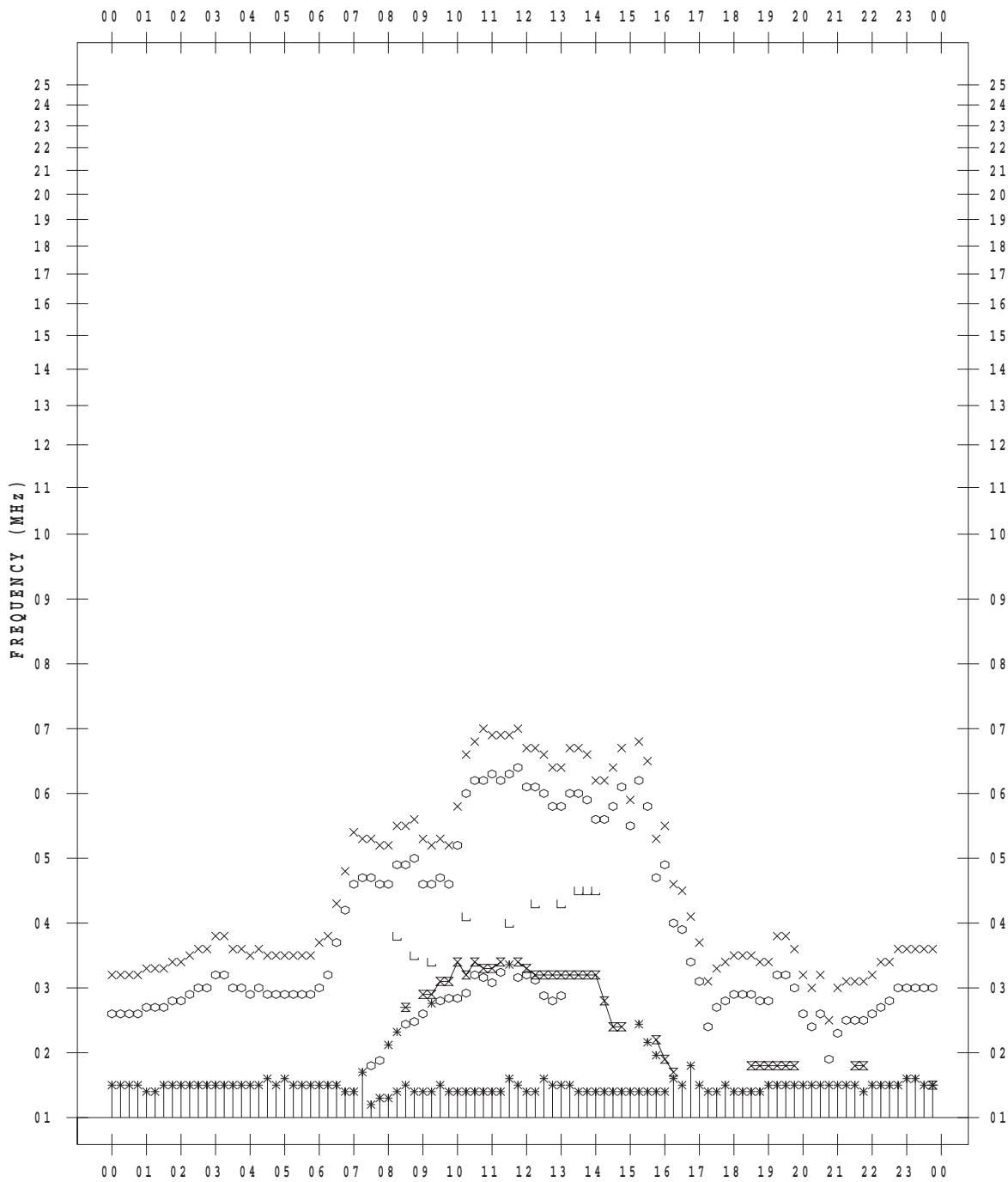
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/19

135 ° E MEAN TIME



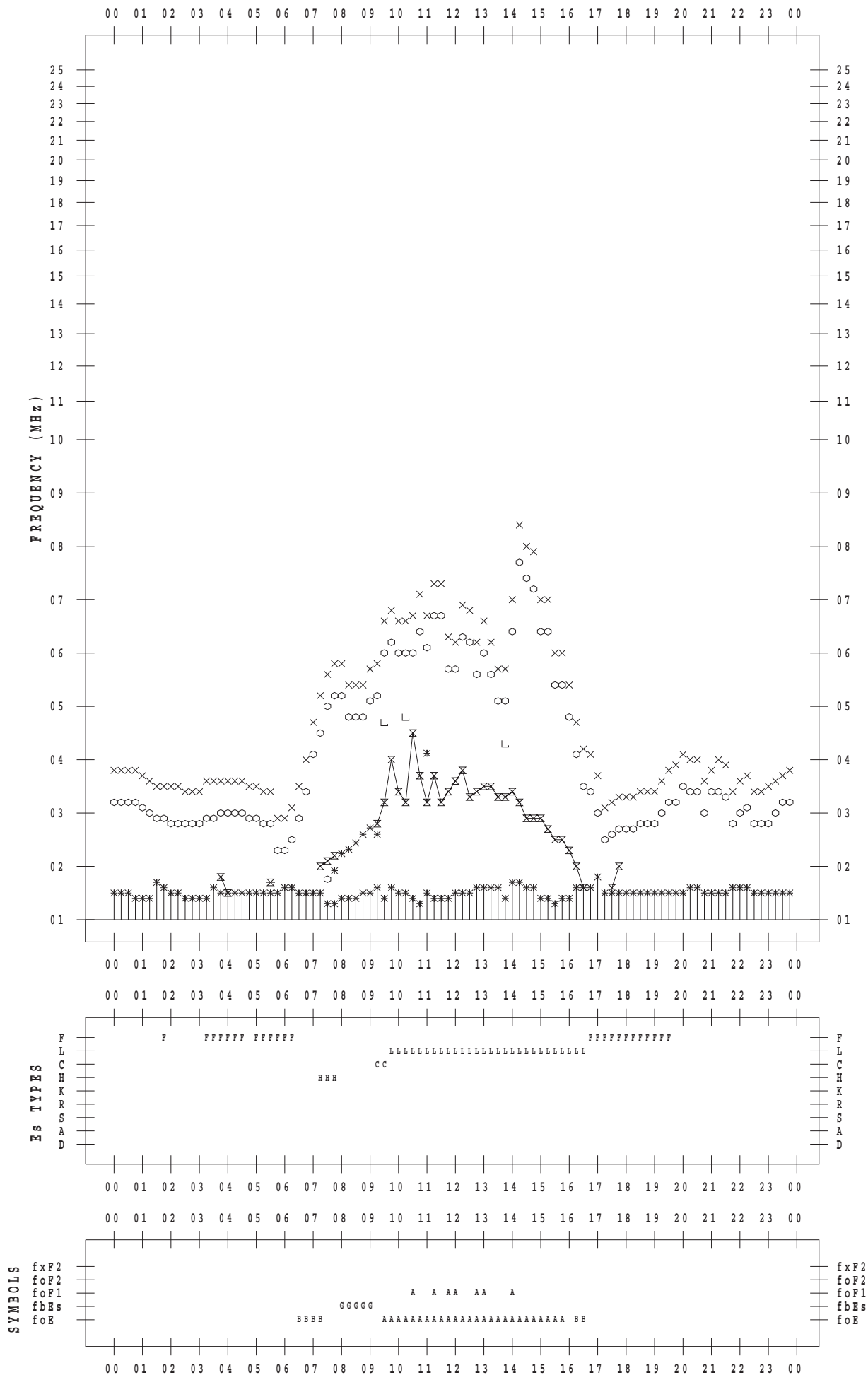
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/20

135 ° E MEAN TIME



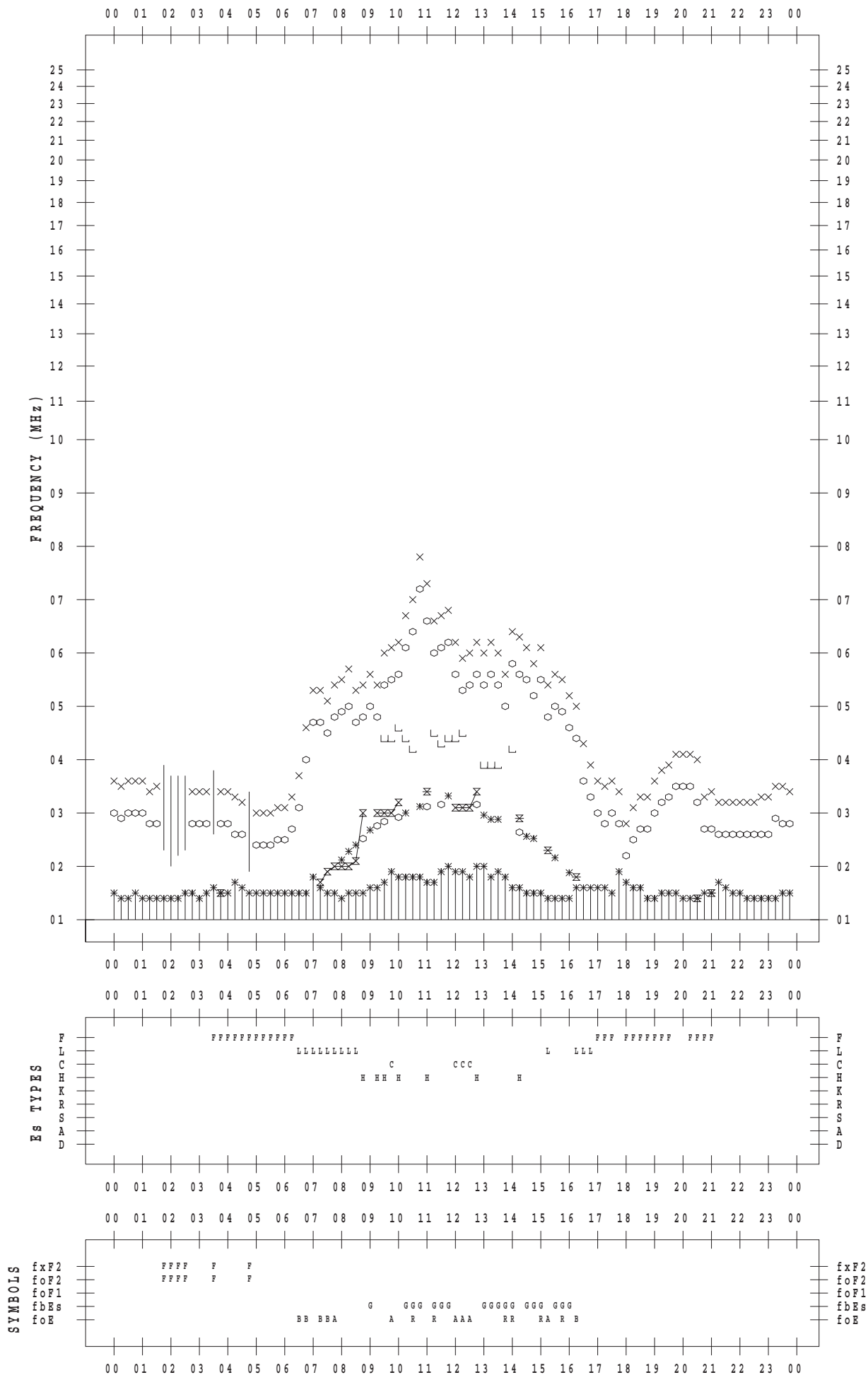
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/21

135 ° E MEAN TIME



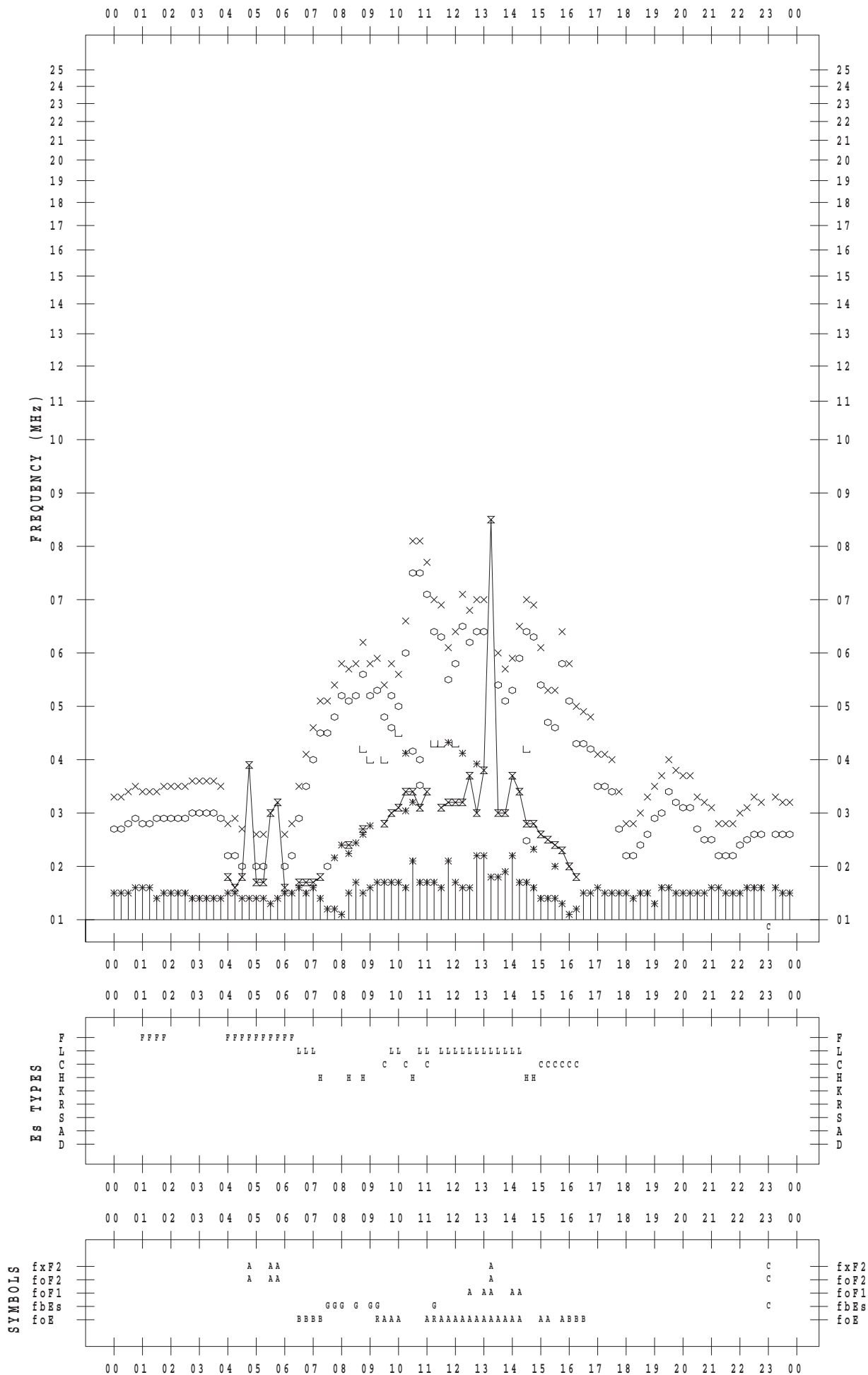
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/22

135 ° E MEAN TIME



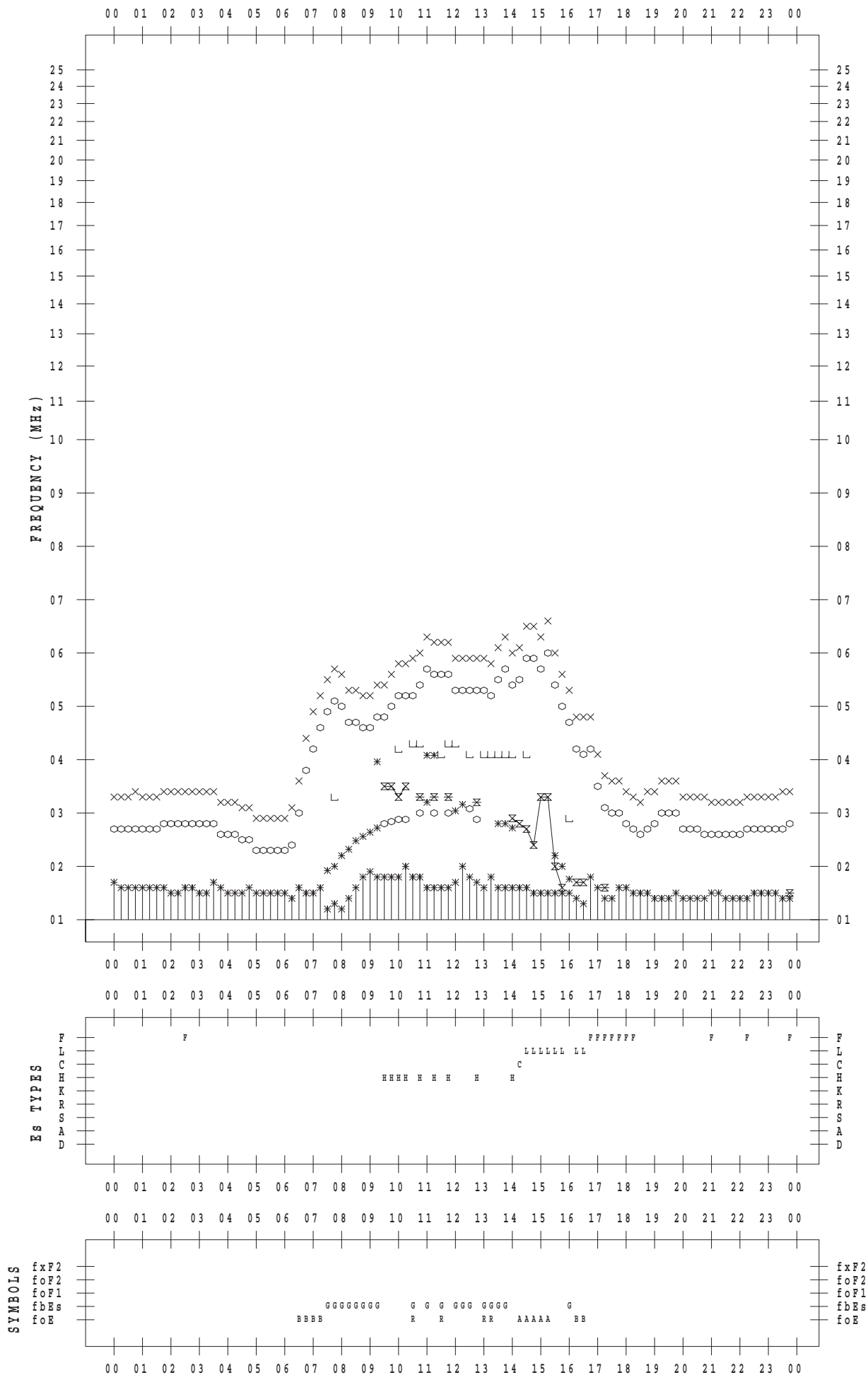
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/23

135 ° E MEAN TIME



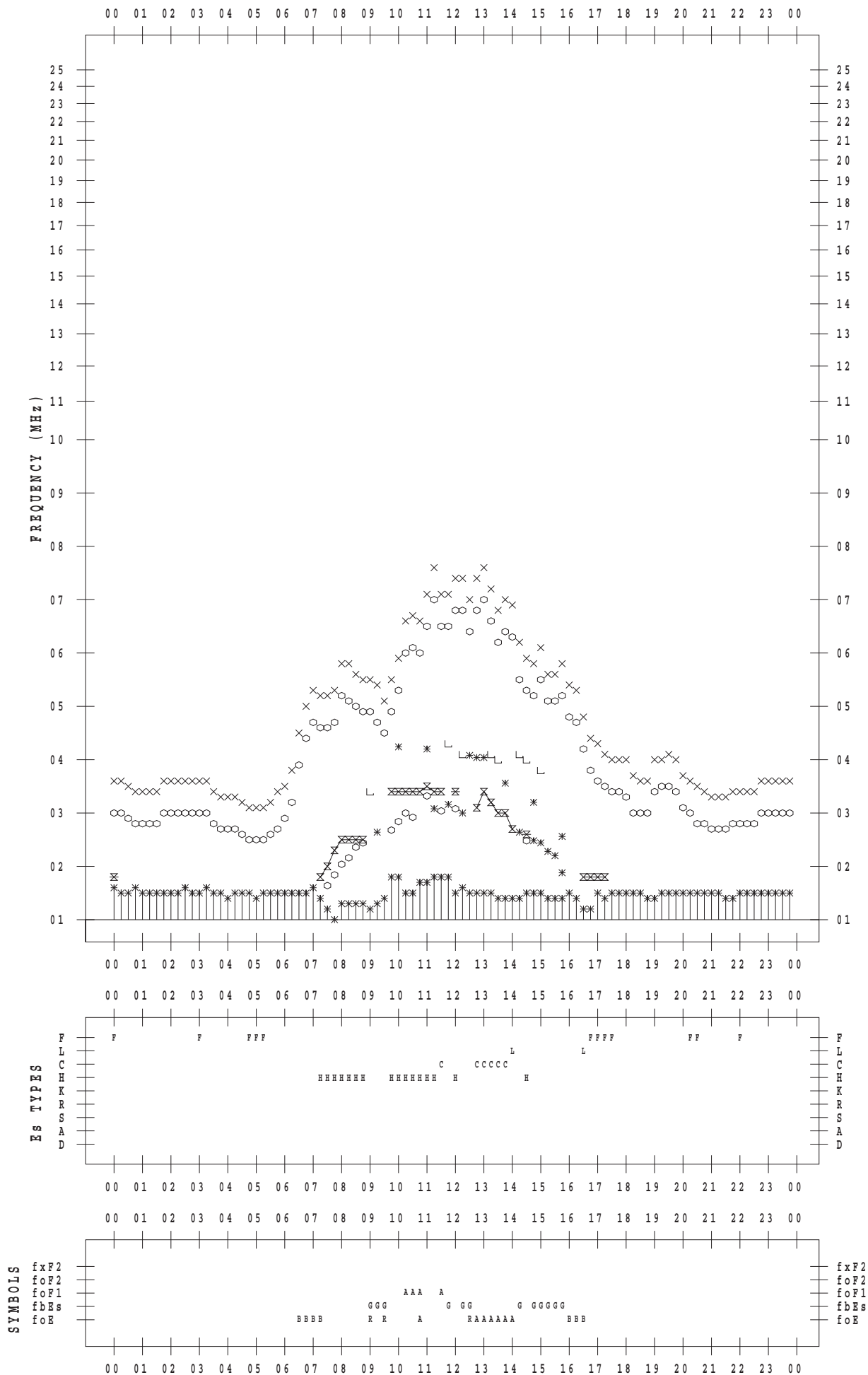
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/24

135 ° E MEAN TIME



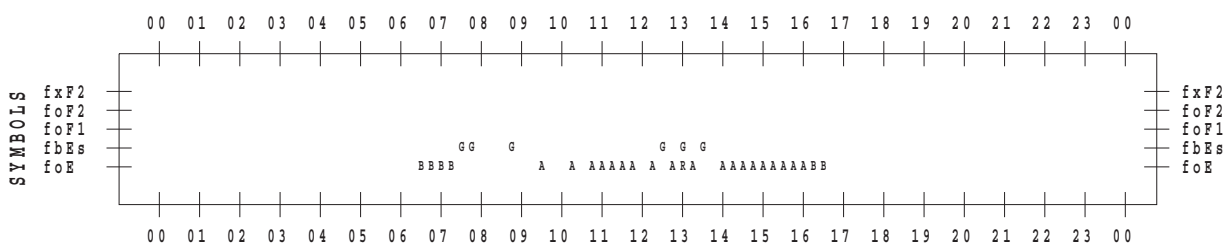
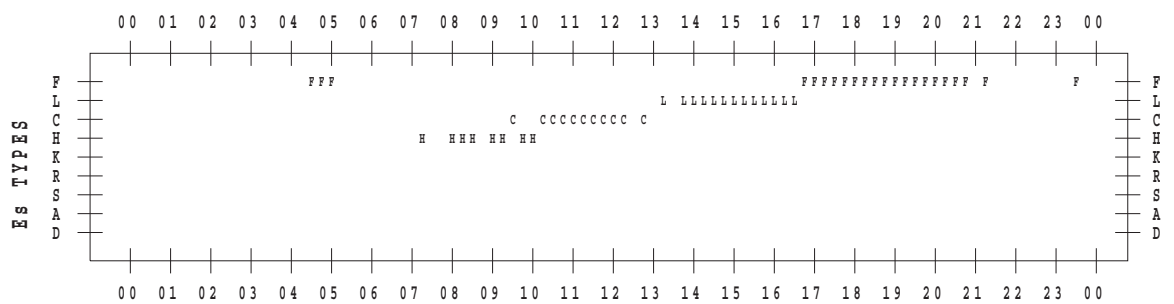
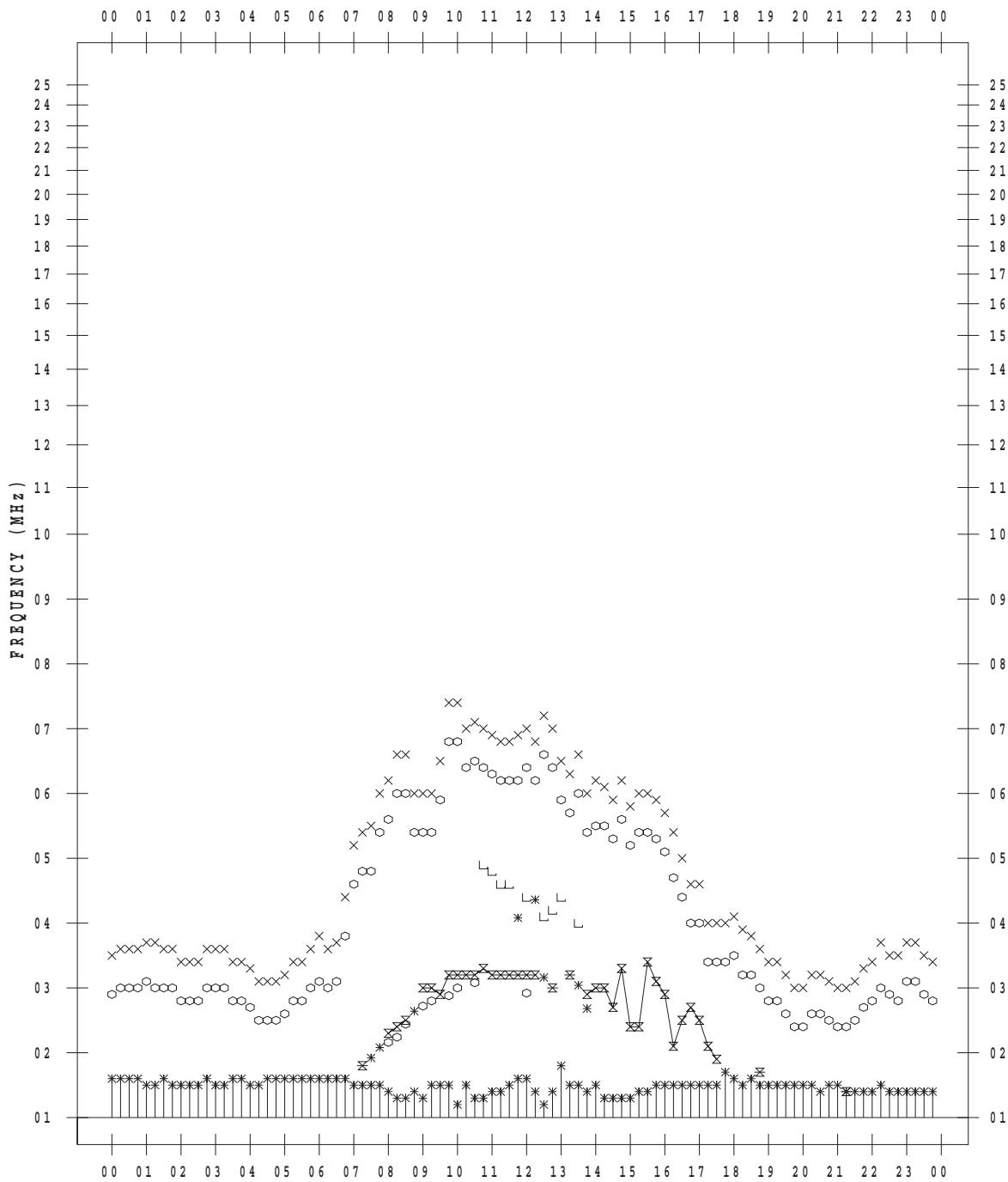
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/25

135 ° E MEAN TIME



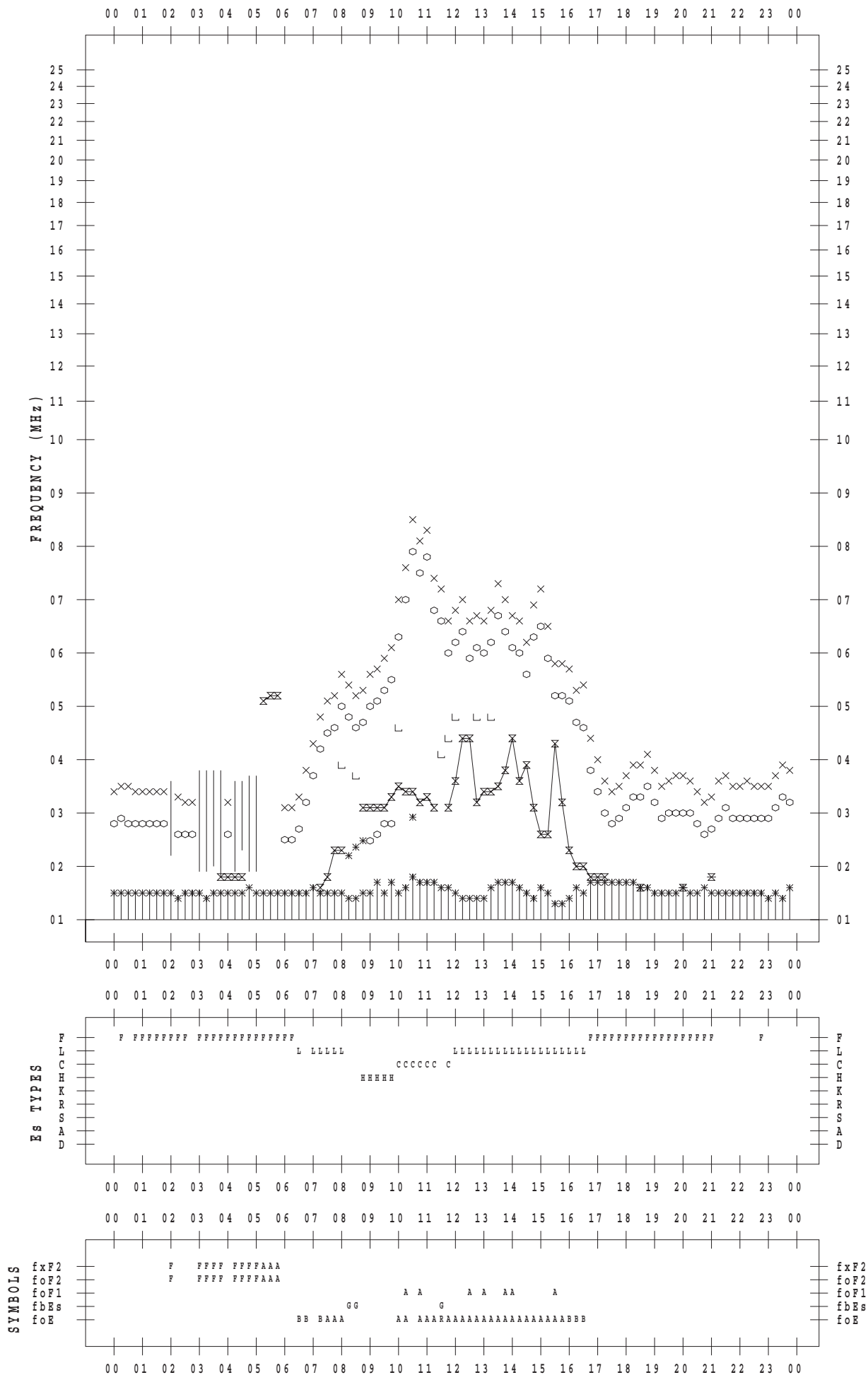
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/26

135 ° E MEAN TIME



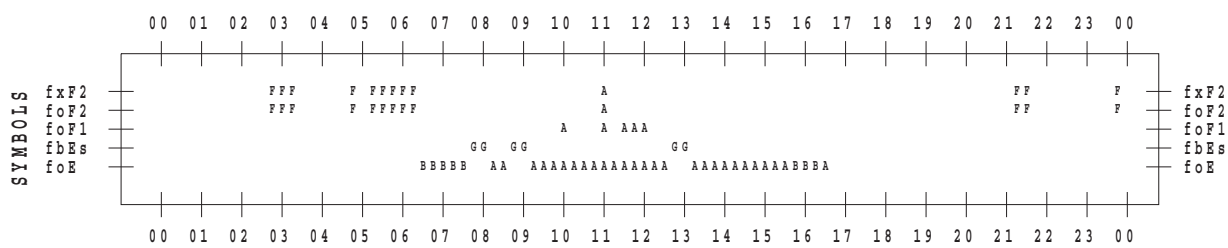
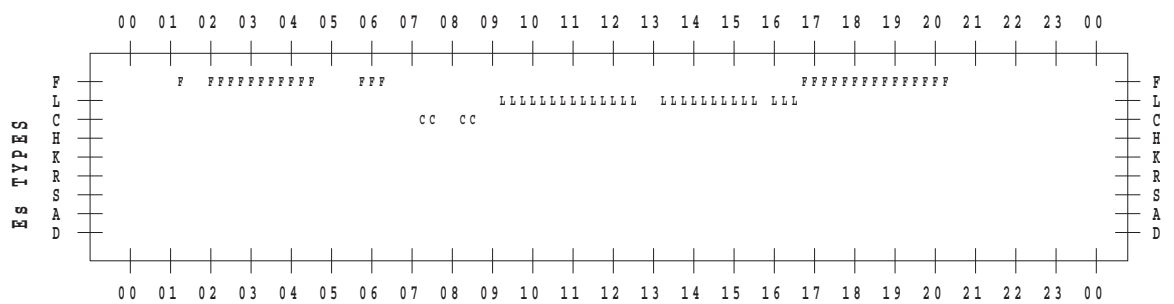
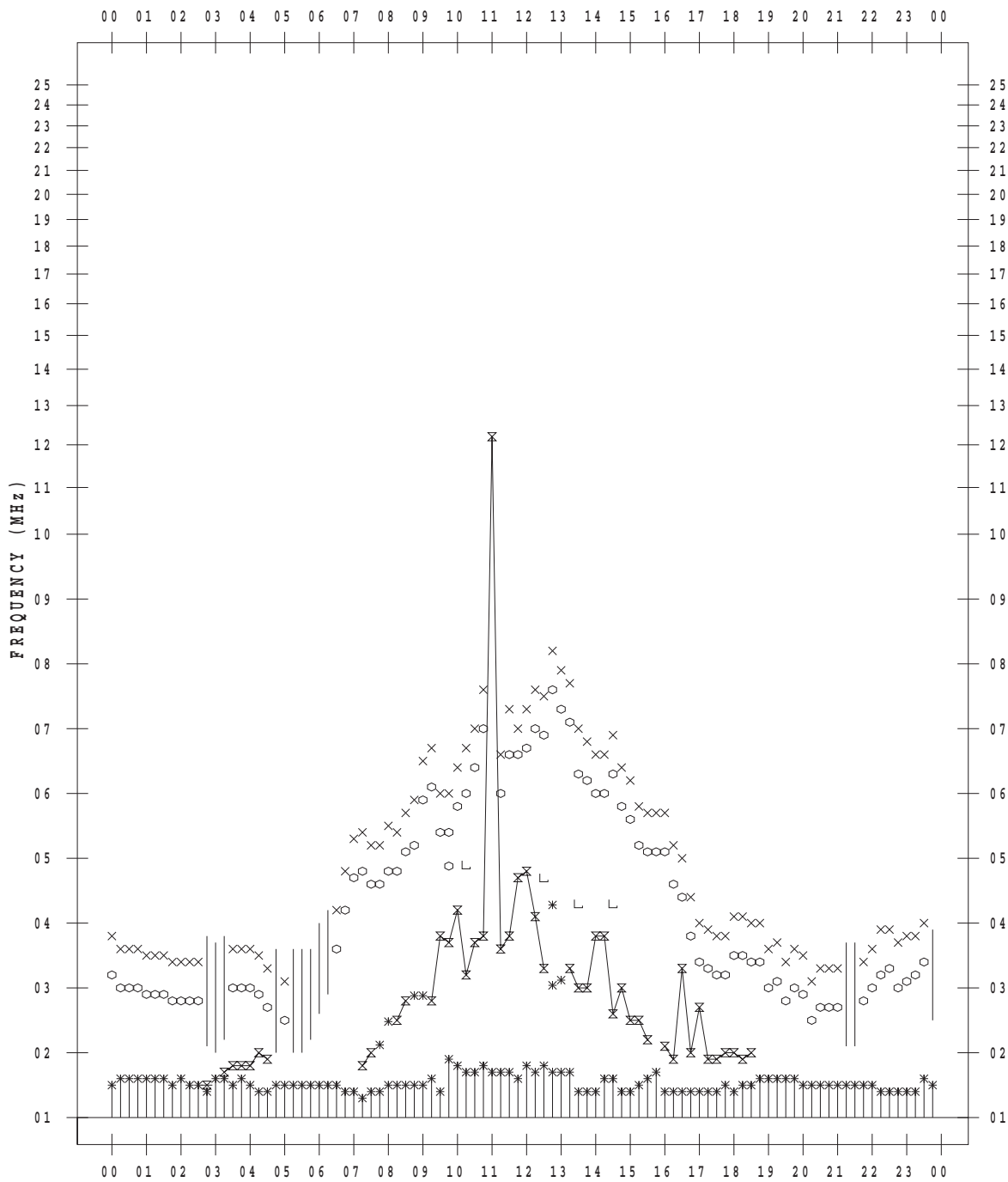
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/27

135 ° E MEAN TIME



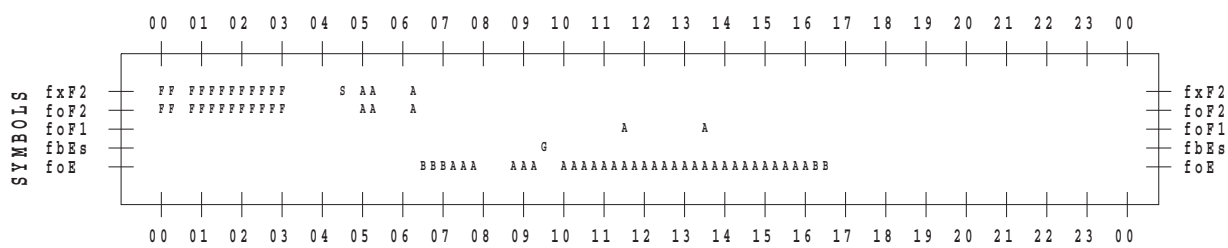
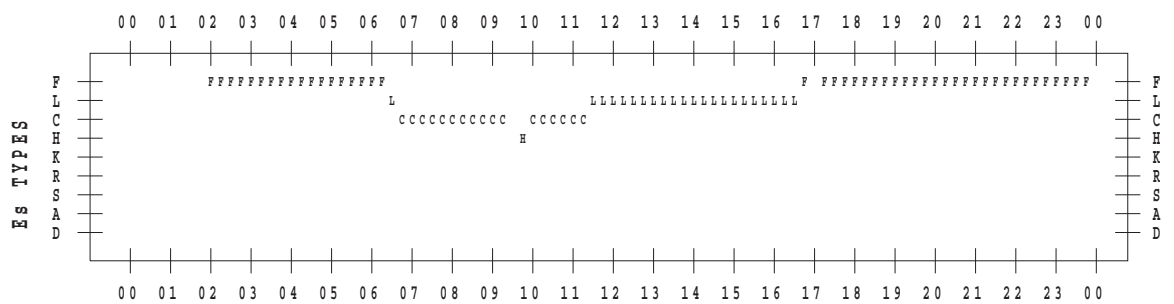
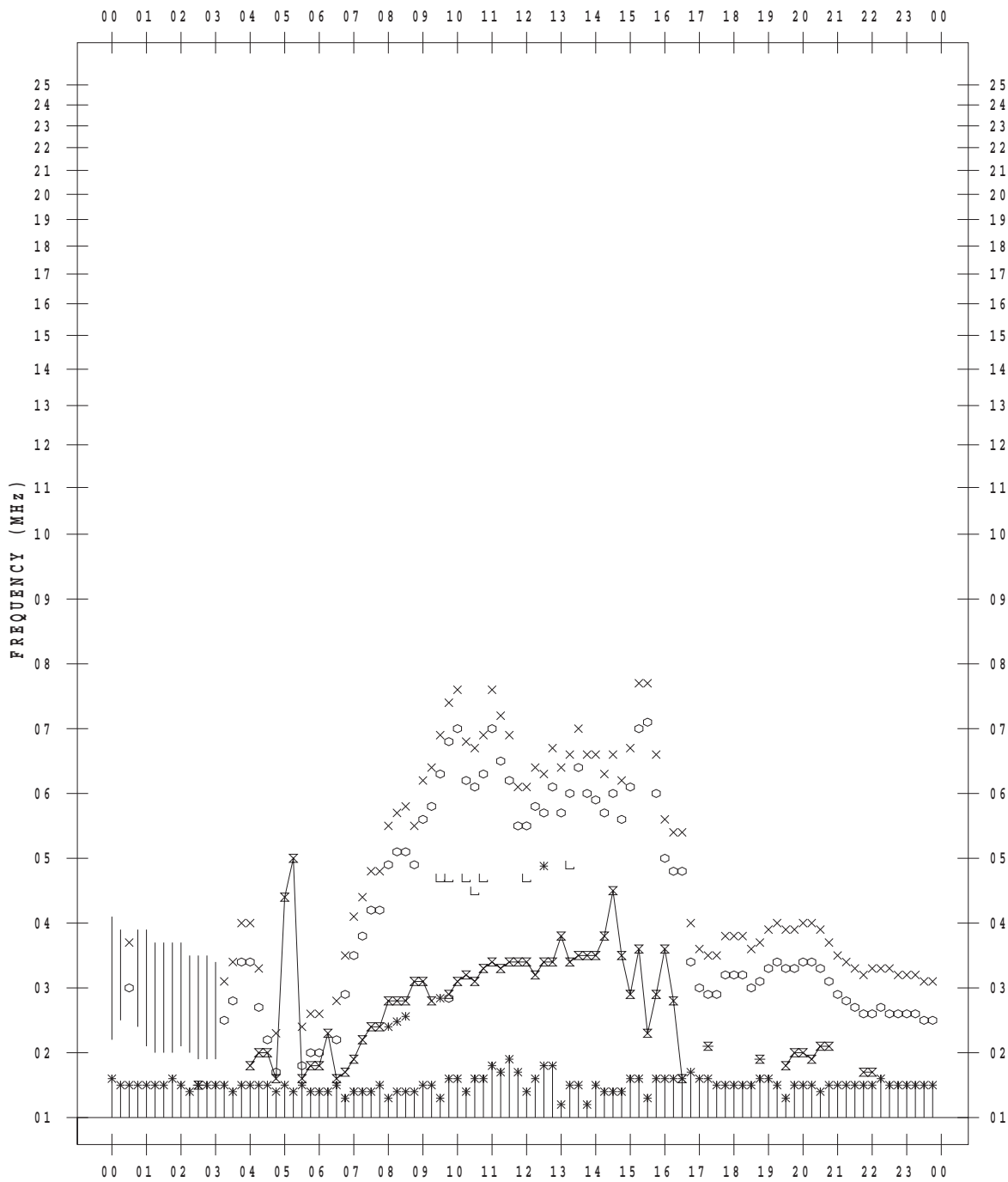
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SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/28

135 ° E MEAN TIME



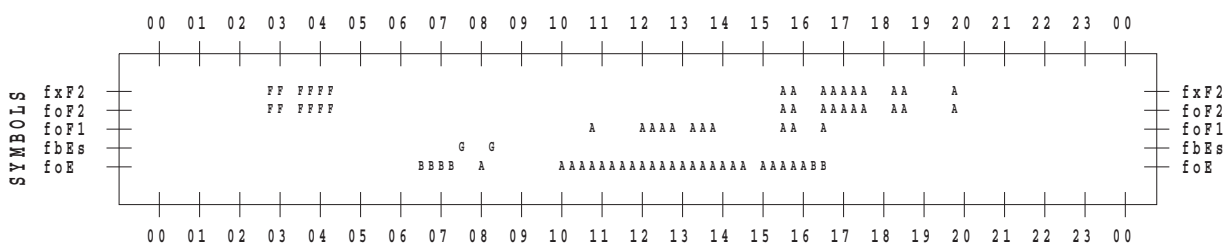
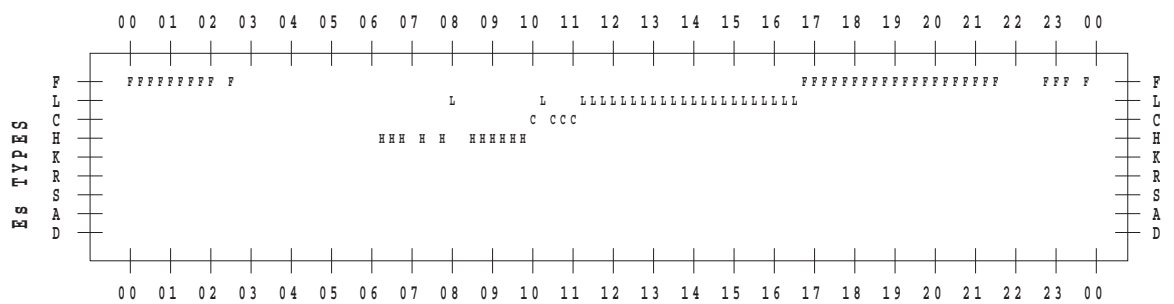
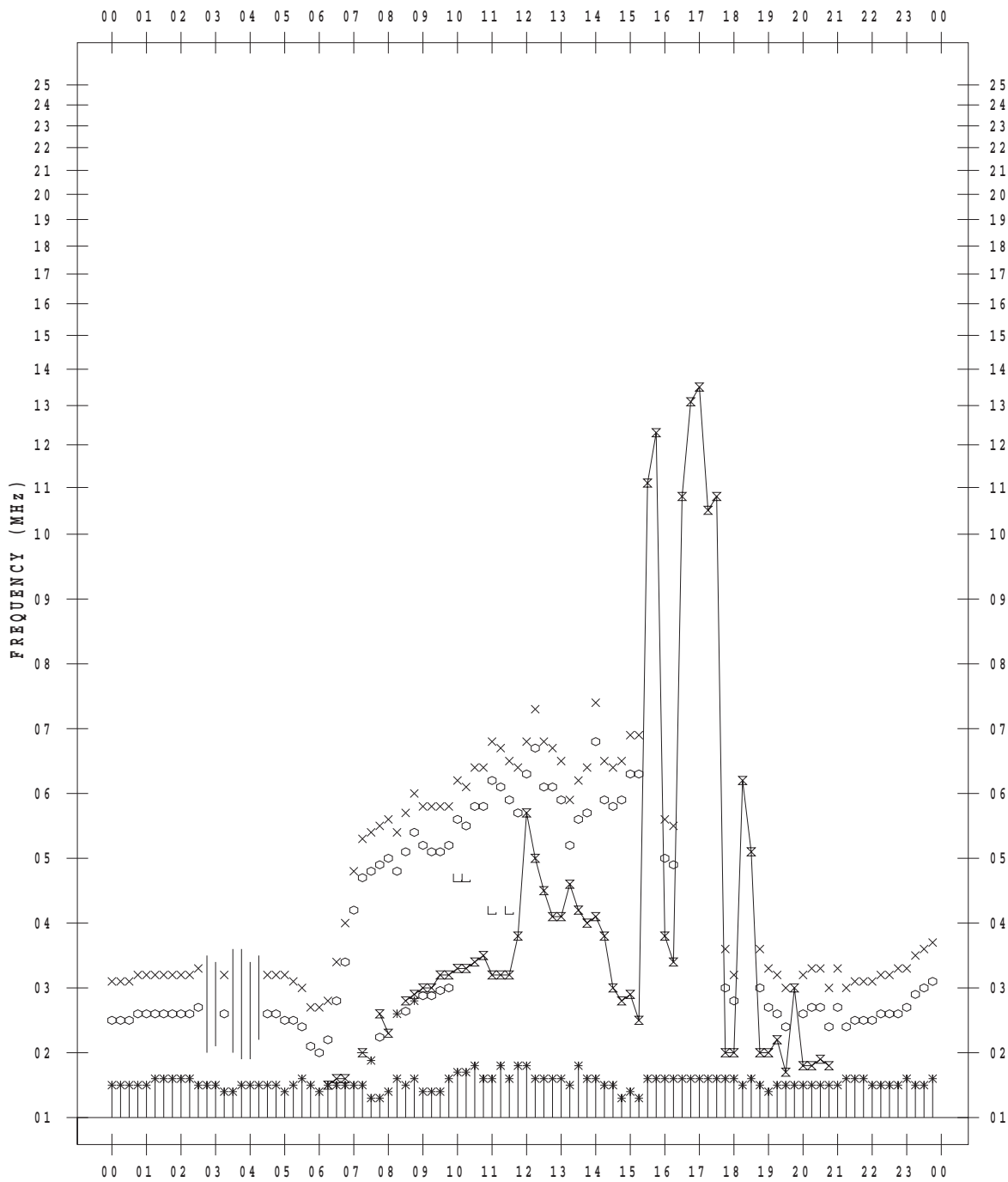
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SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/29

135 ° E MEAN TIME



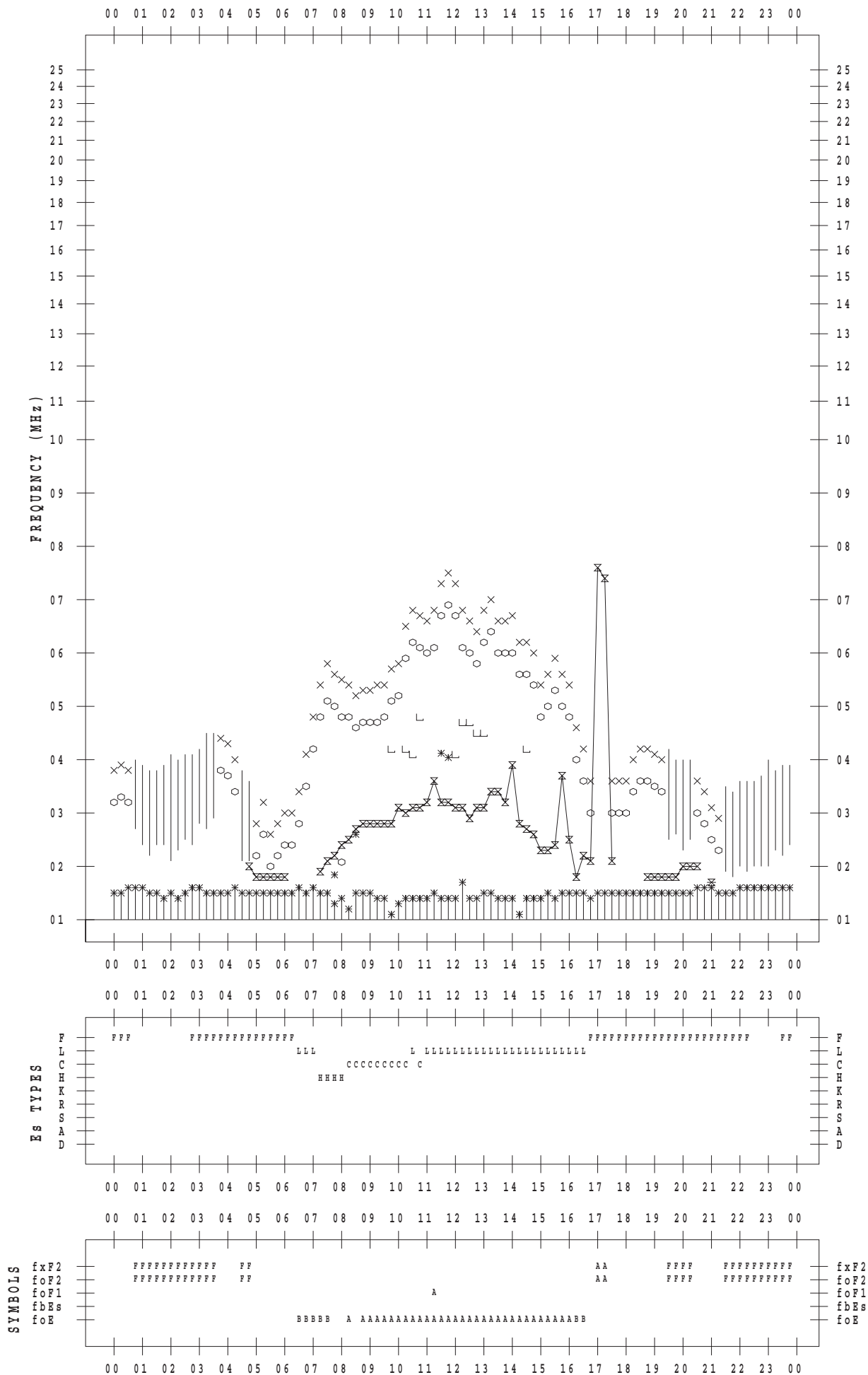
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/30

135 ° E MEAN TIME



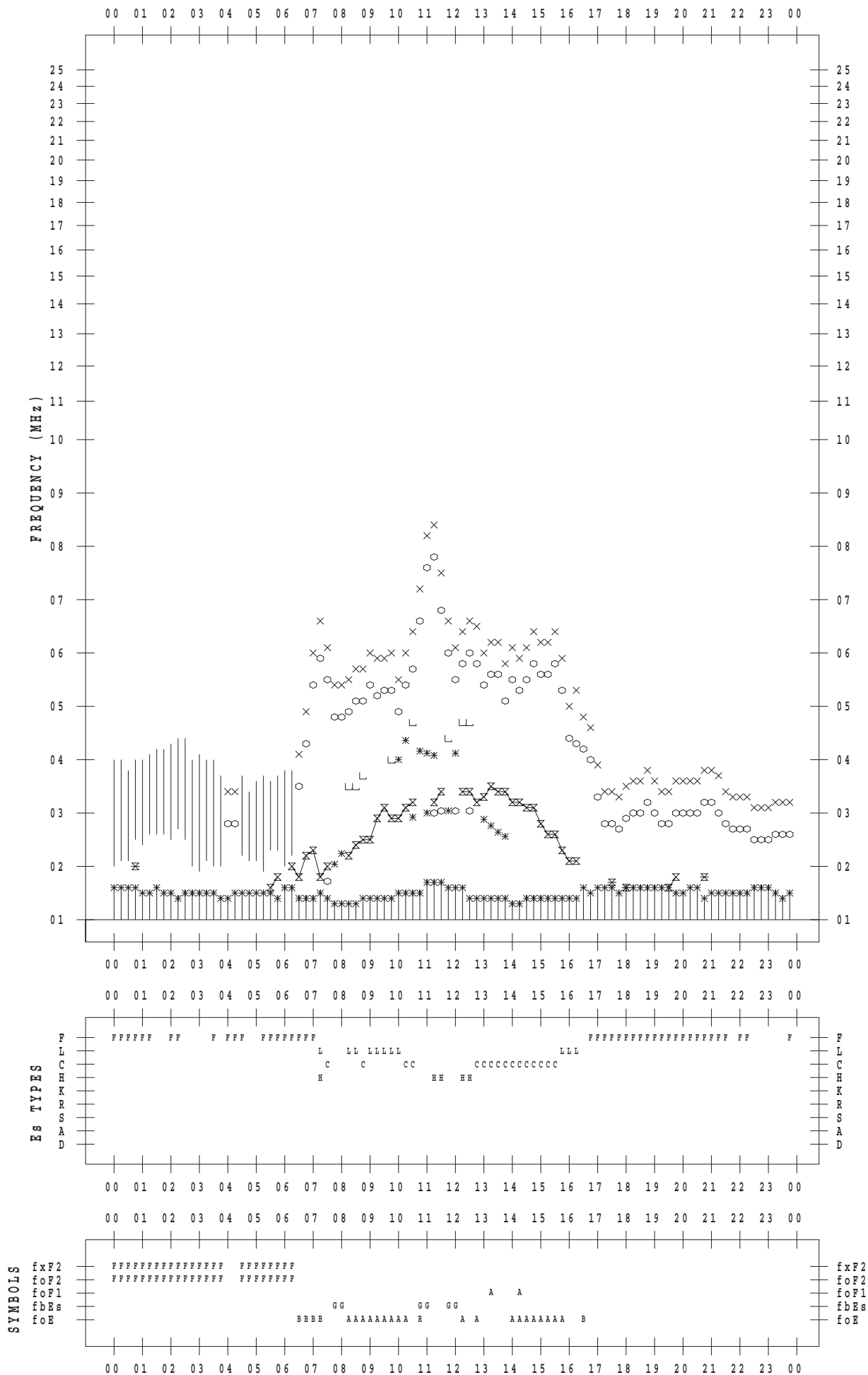
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SCALER : I.NISHIMUTA

STATION : Kokubunji

DATE : 2017/12/31

135 ° E MEAN TIME



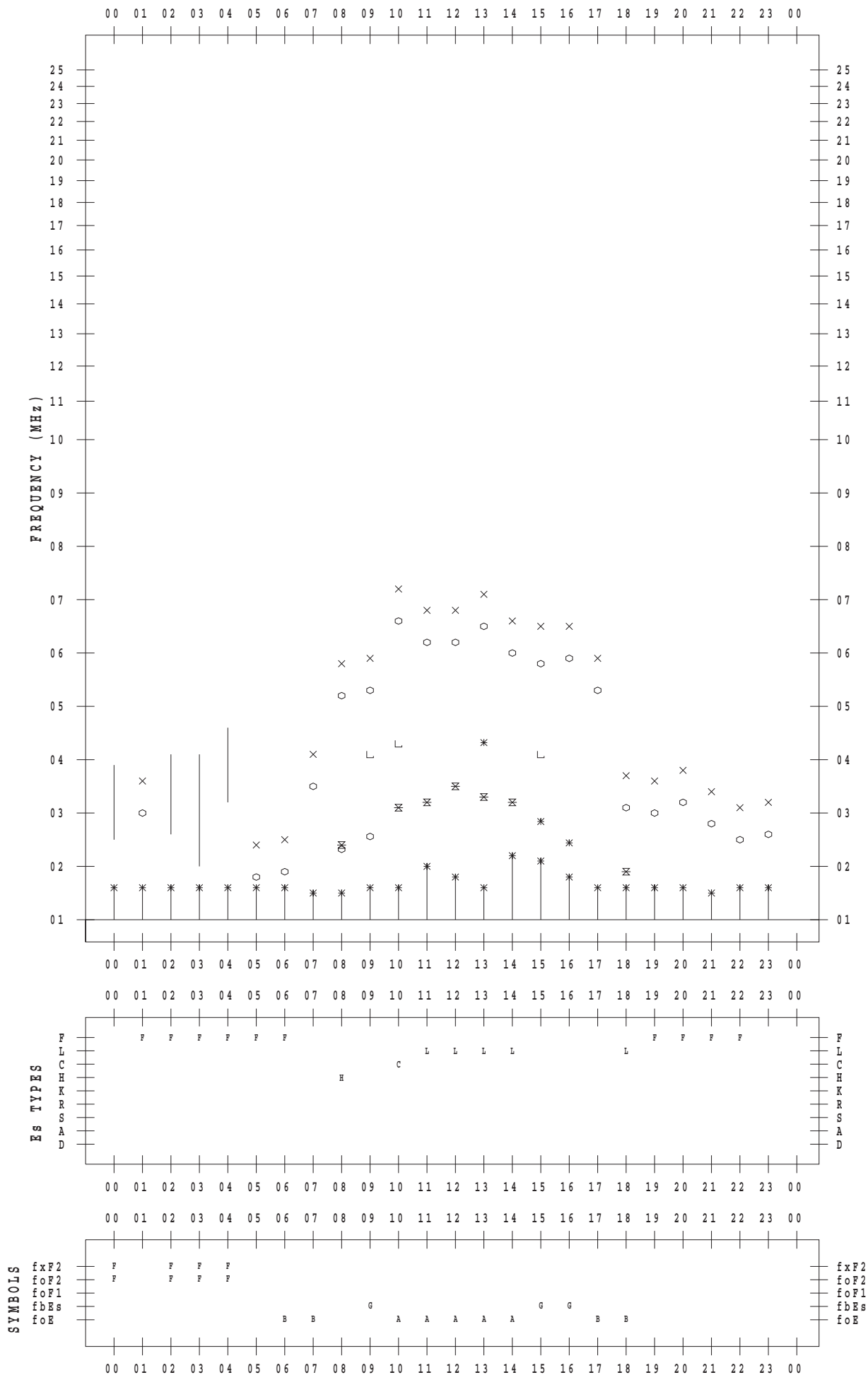
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 1

135 ° E MEAN TIME



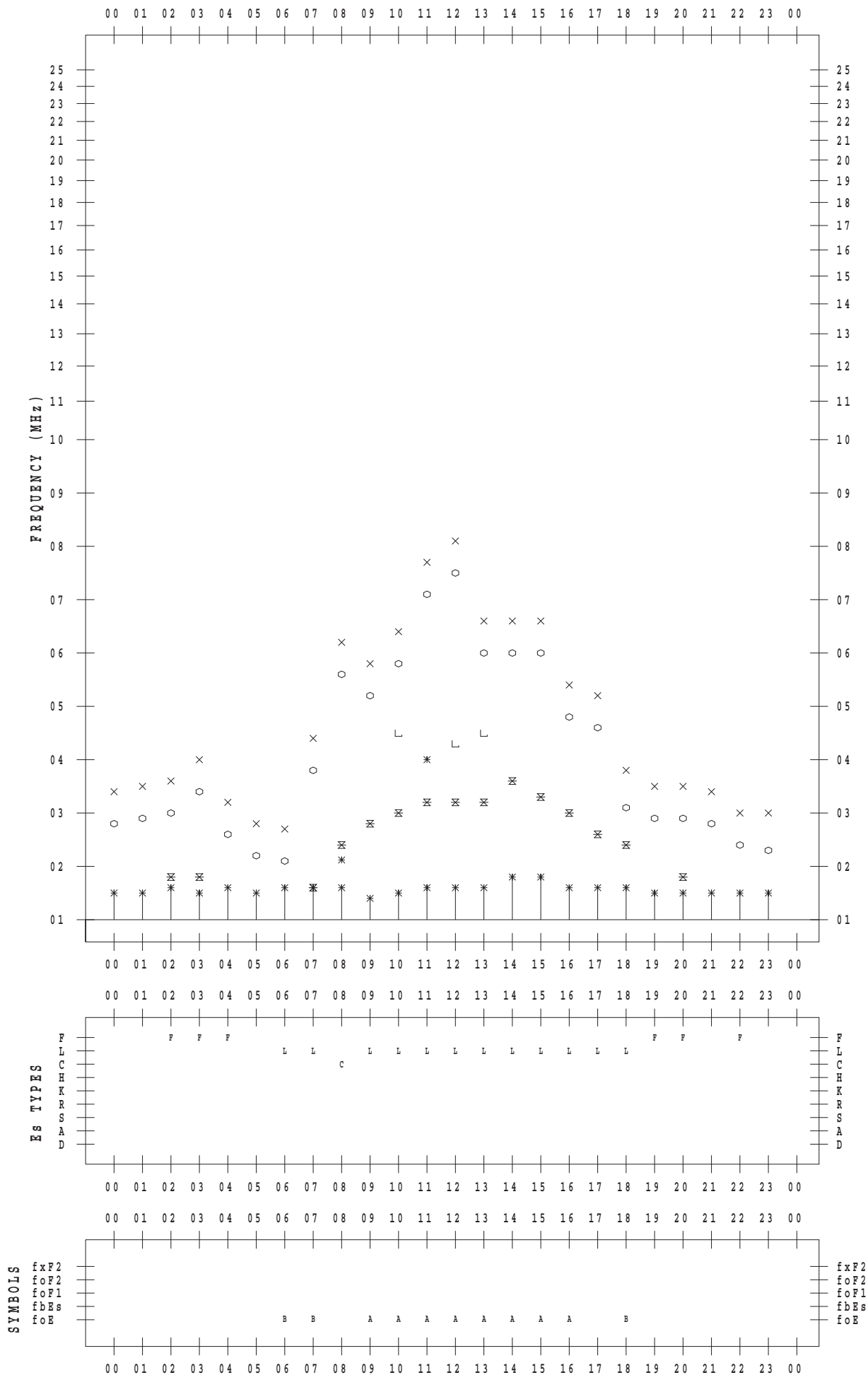
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 2

135 ° E MEAN TIME



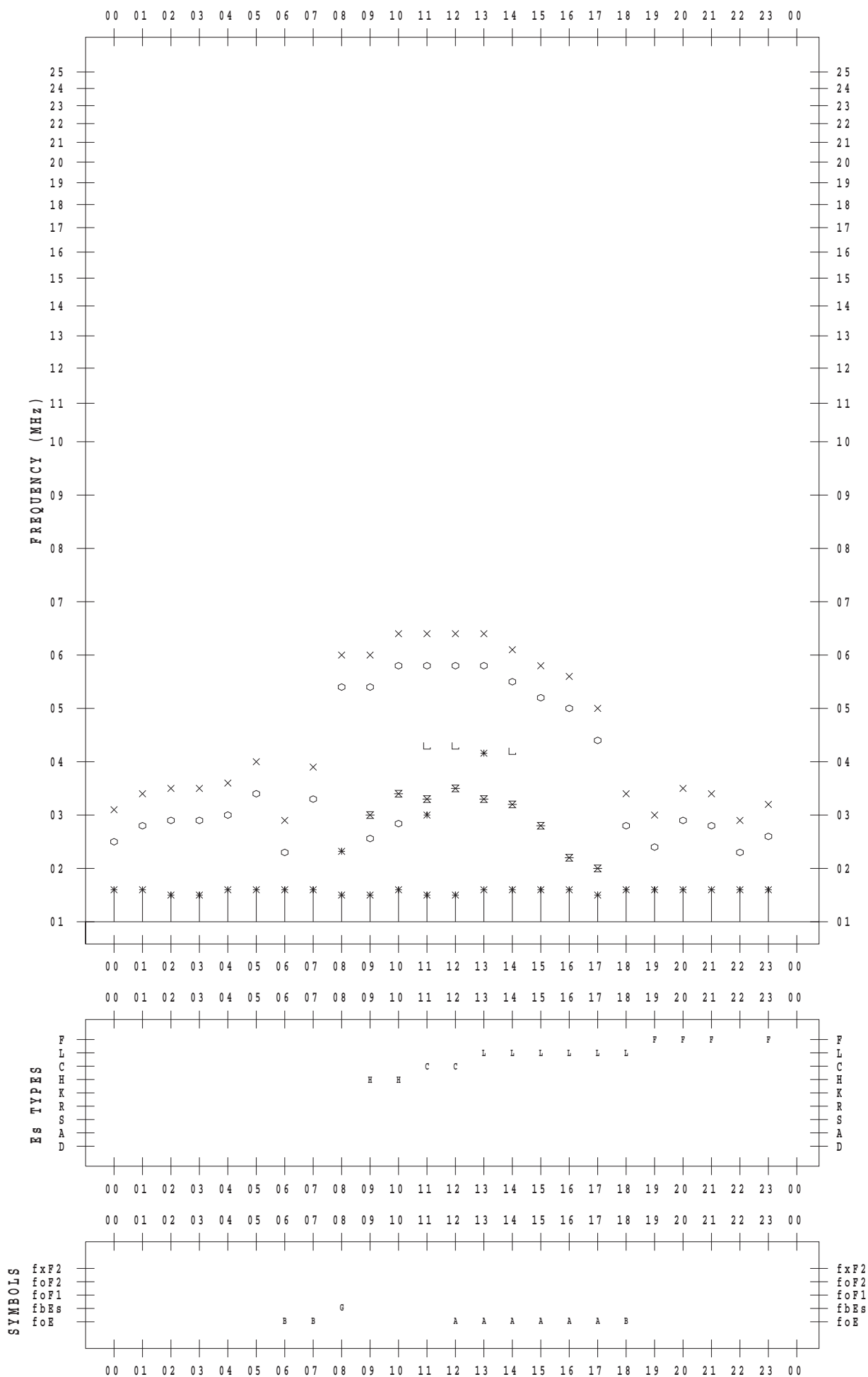
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 3

135 ° E MEAN TIME



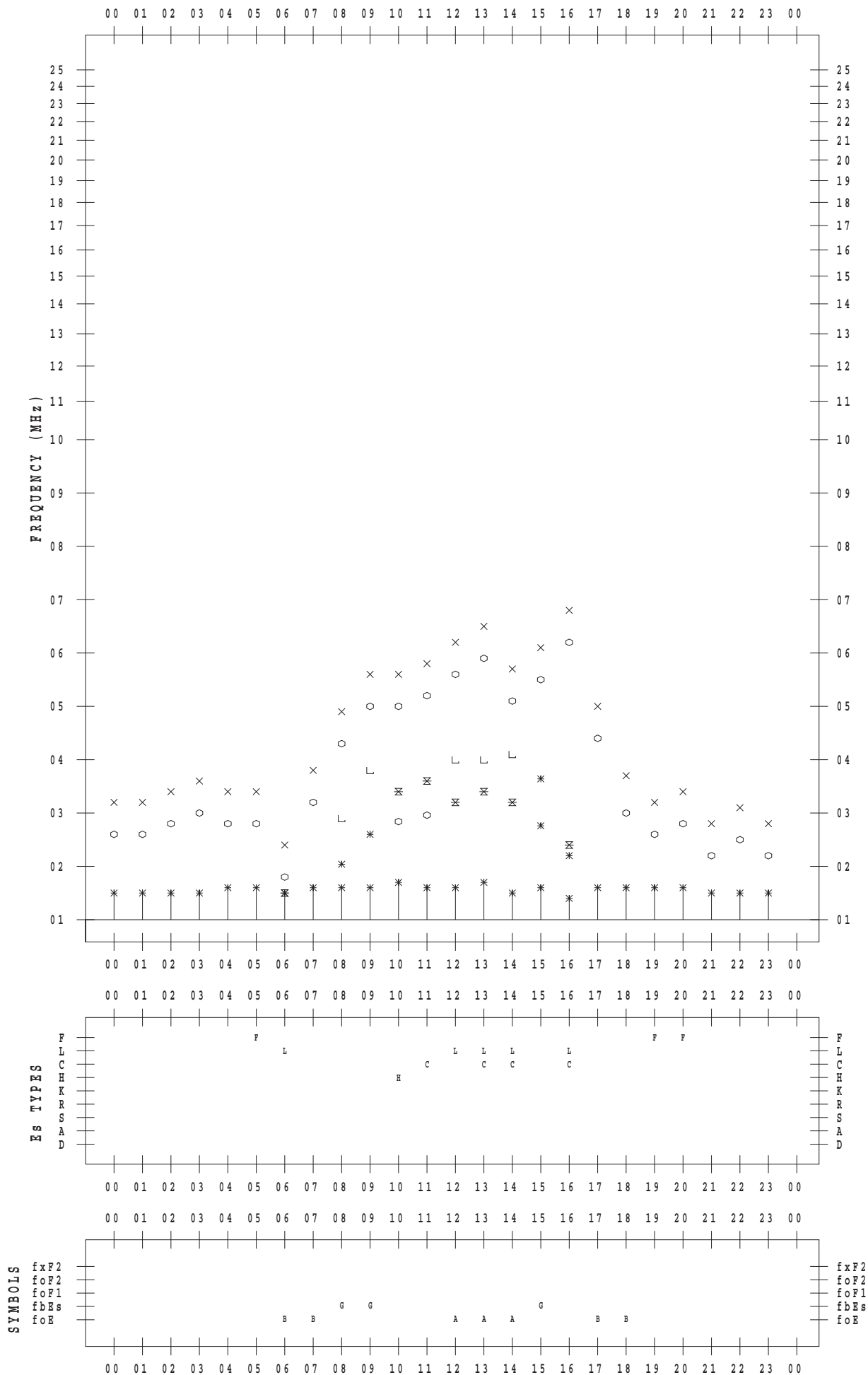
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 4

135 ° E MEAN TIME



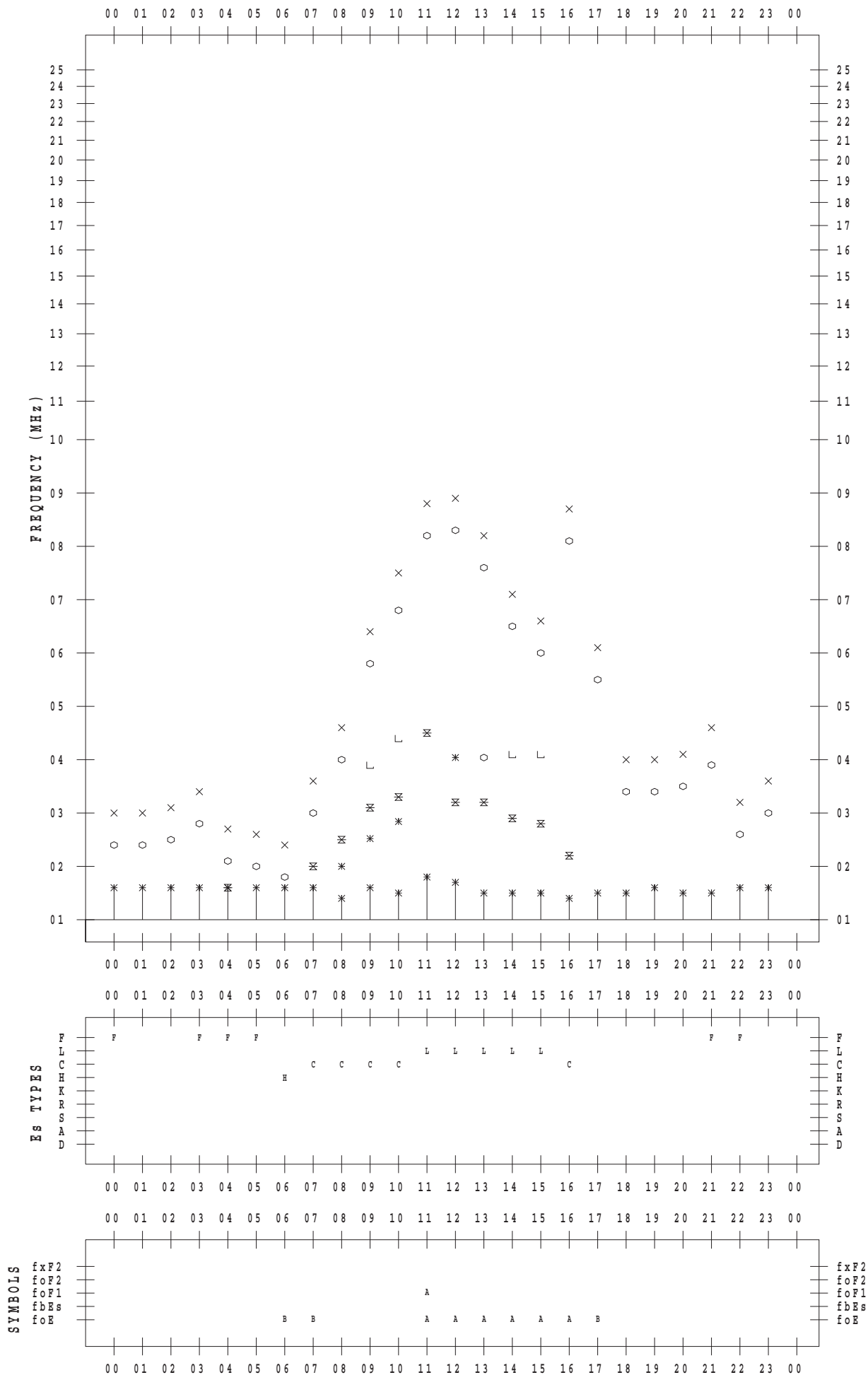
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 5

135 ° E MEAN TIME



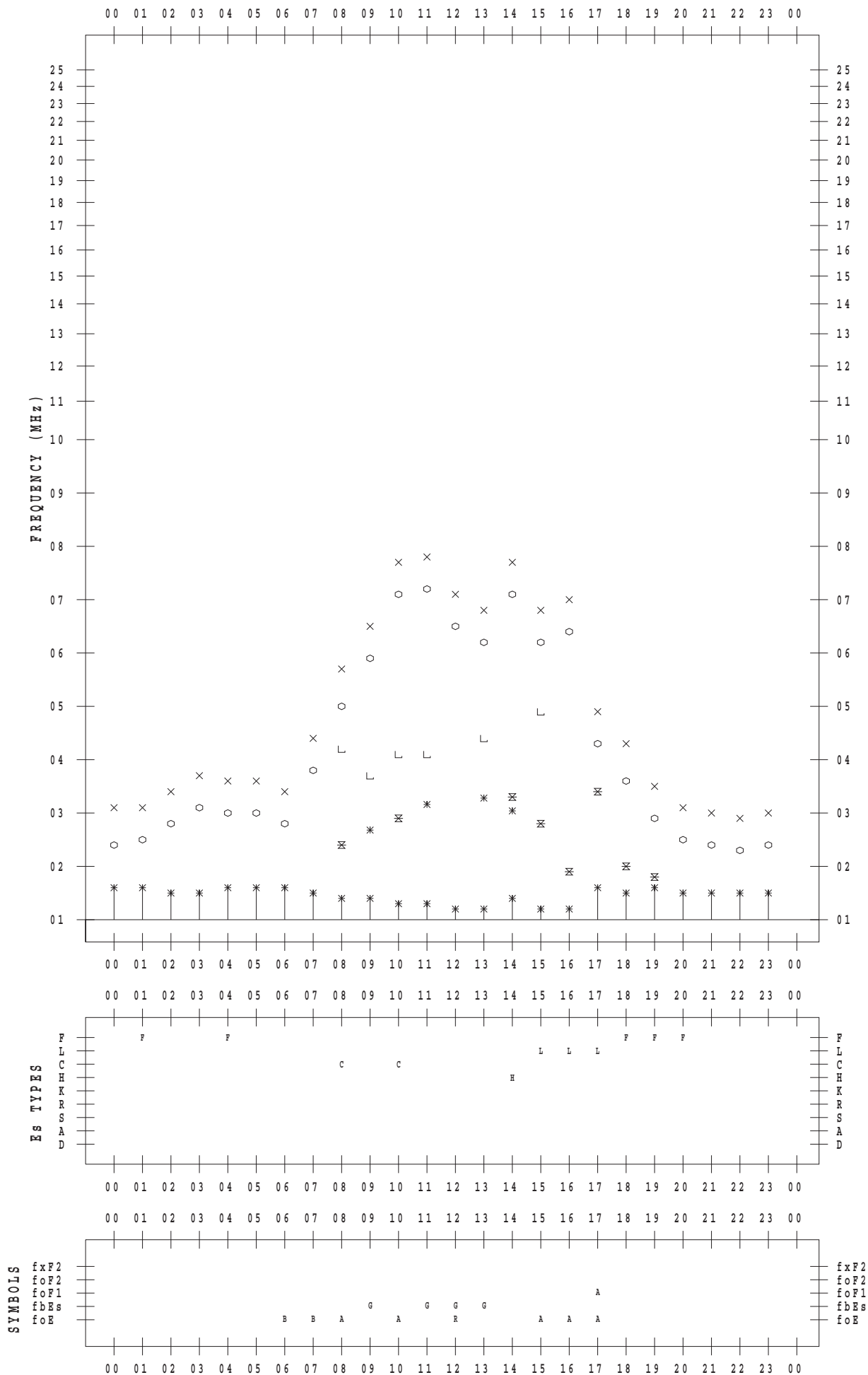
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 6

135 ° E MEAN TIME



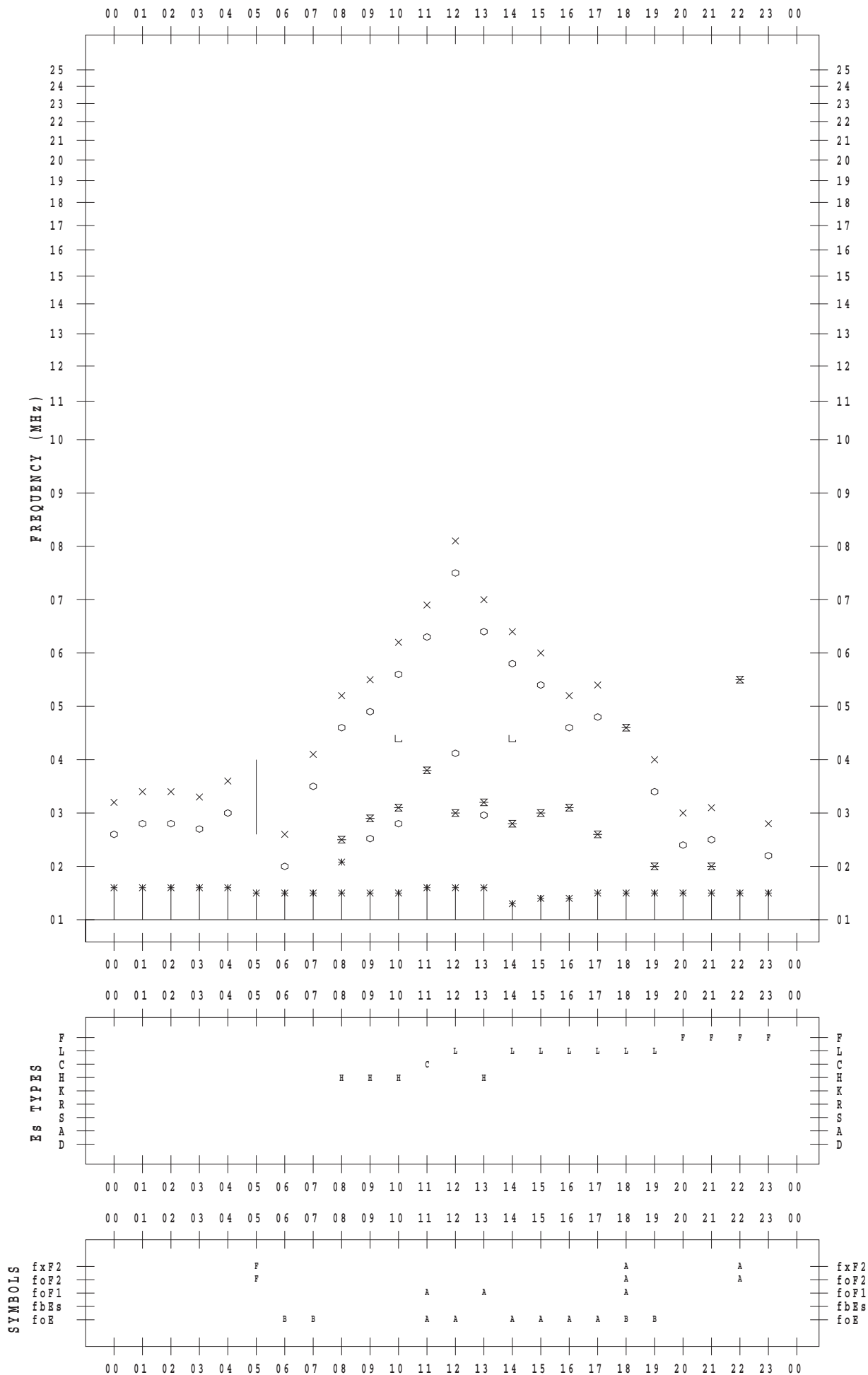
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/7

135 ° E MEAN TIME



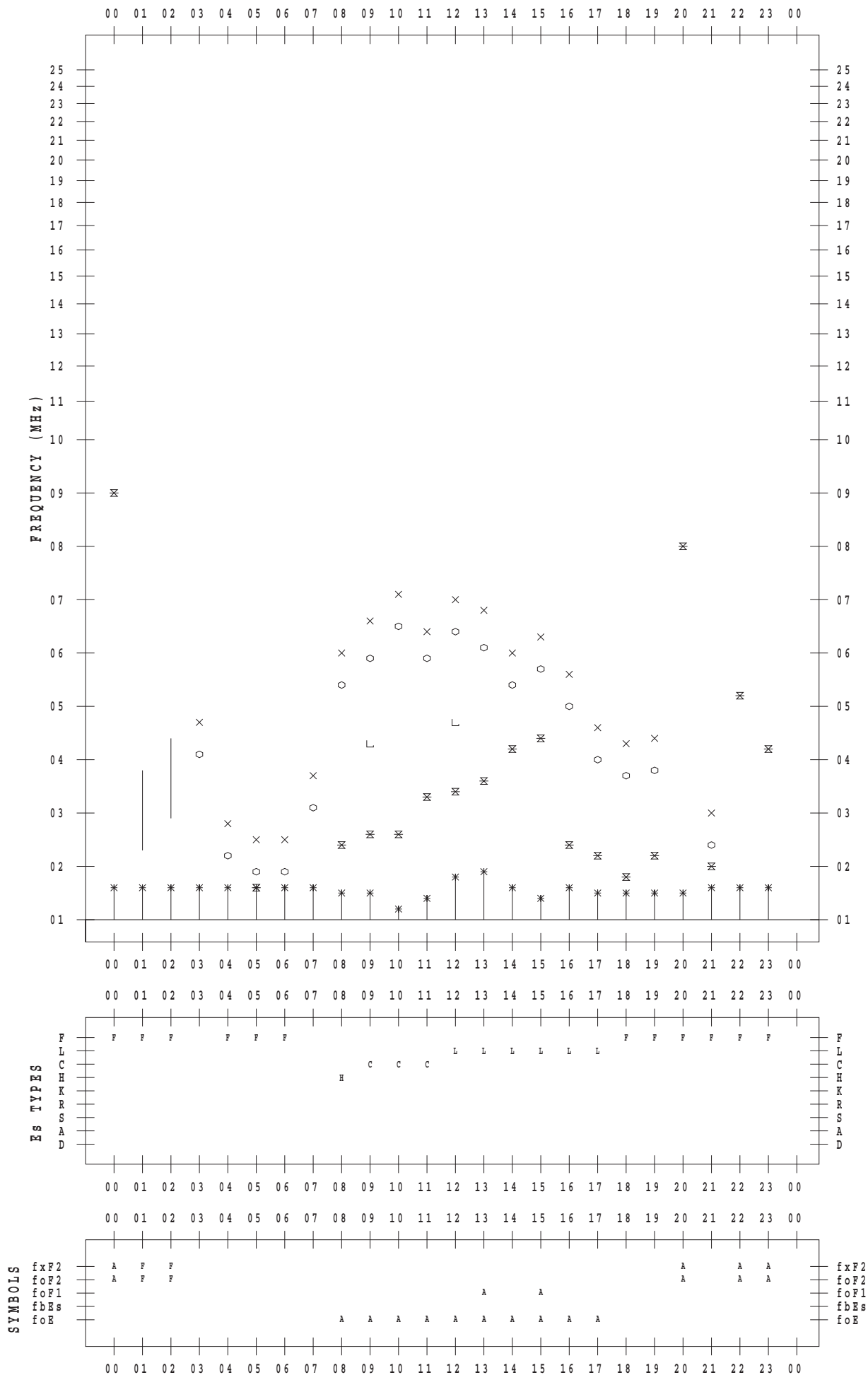
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 8

135 ° E MEAN TIME



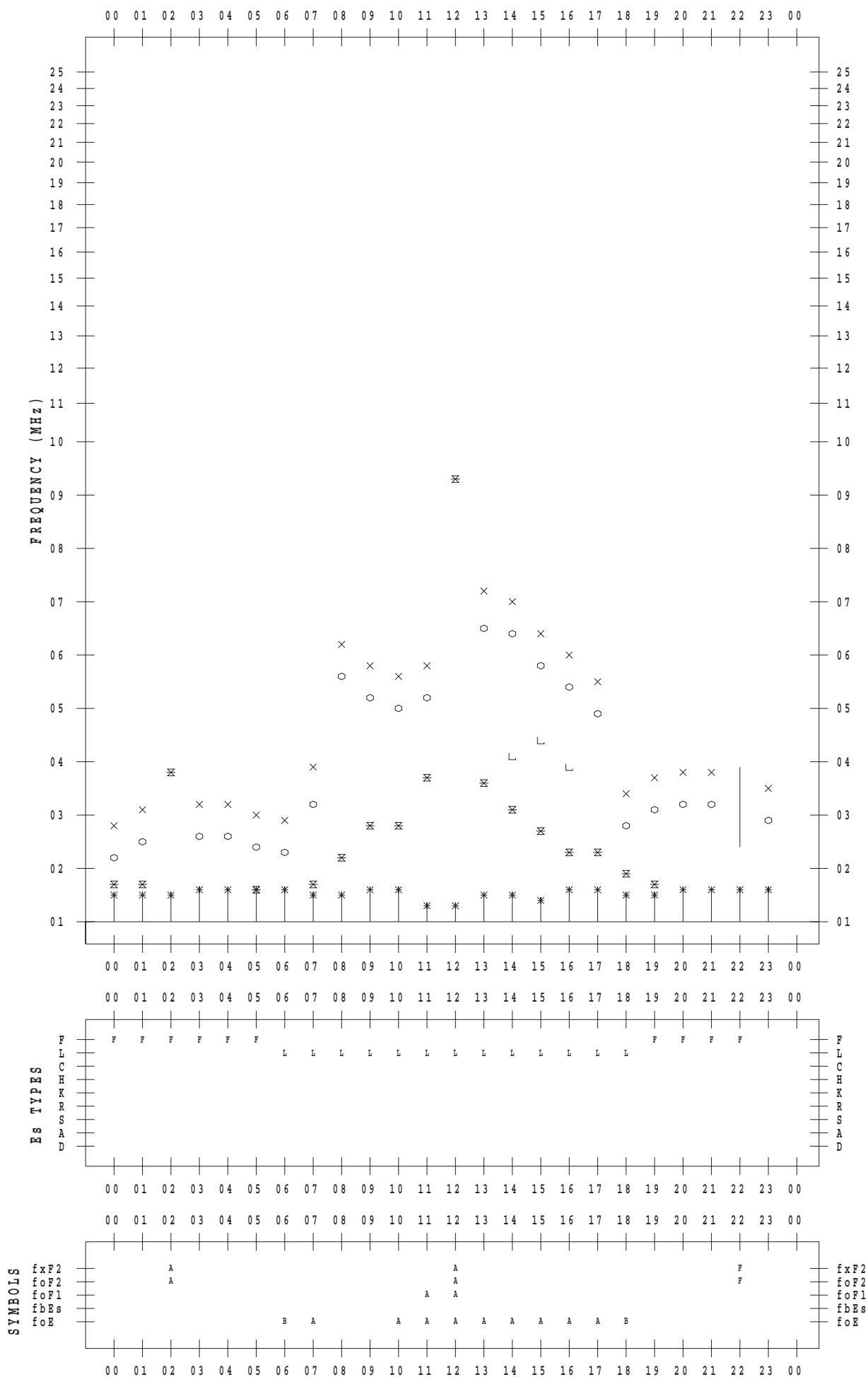
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/ 9

135 ° E MEAN TIME



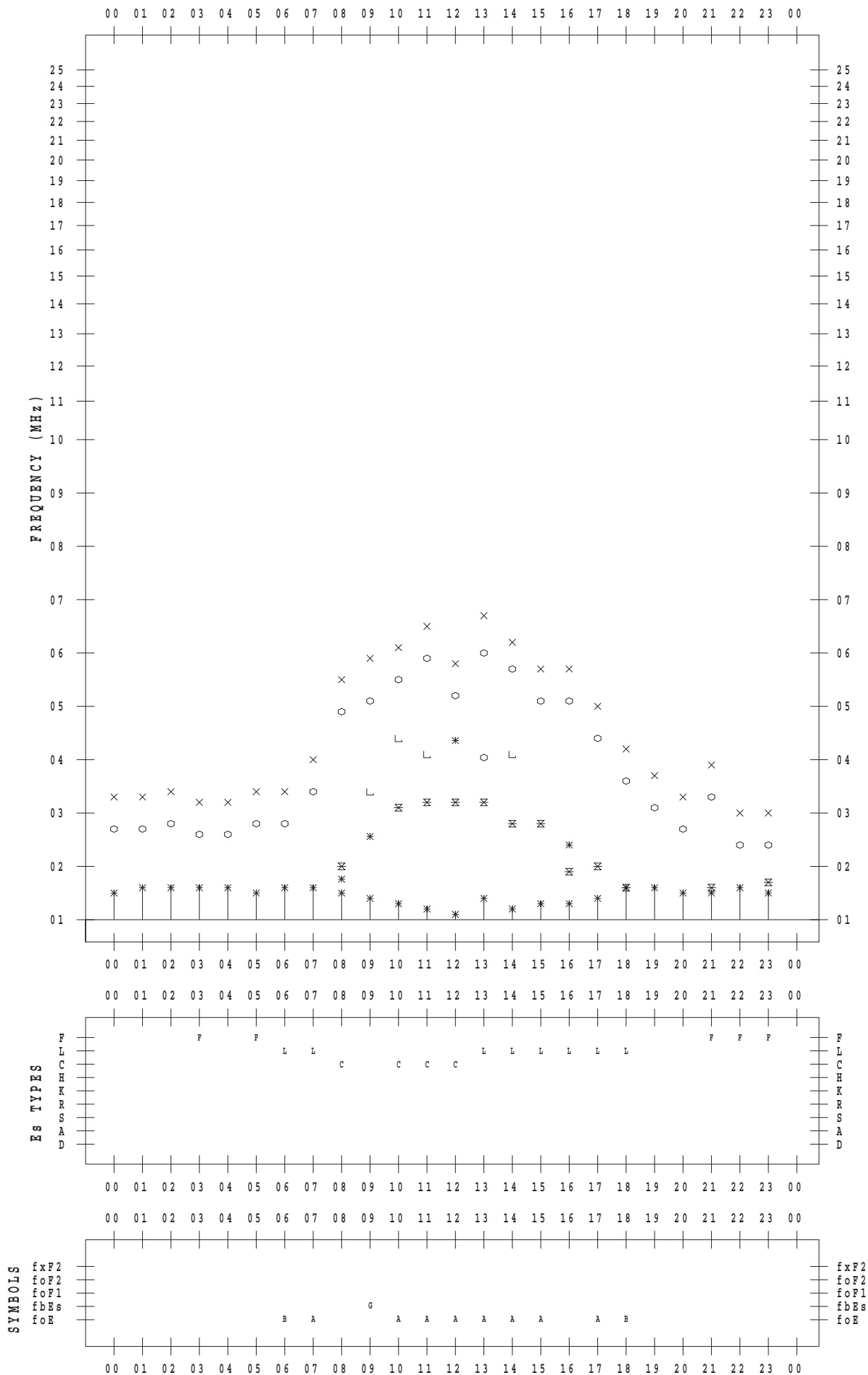
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SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/10

135 ° E MEAN TIME



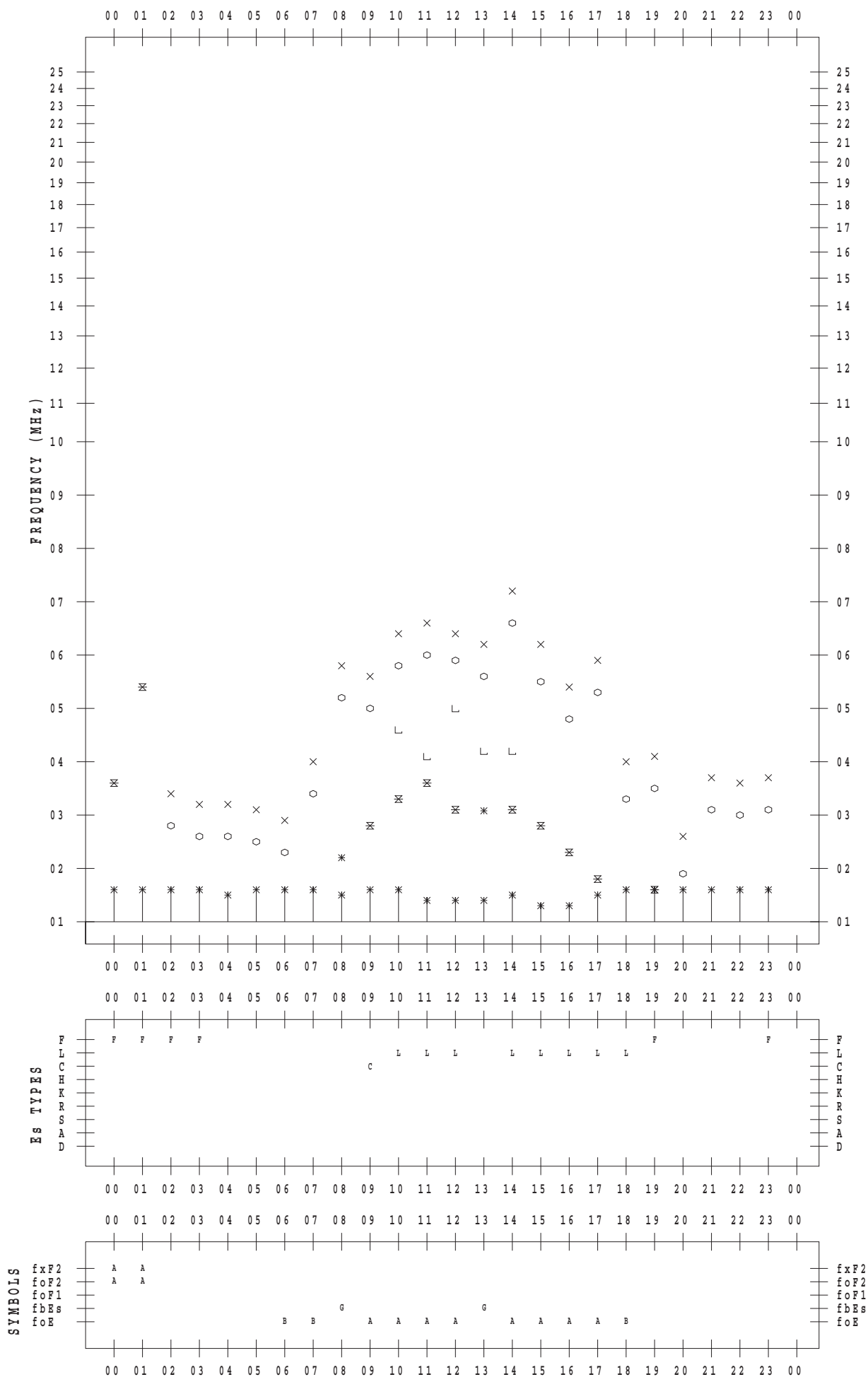
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/11

135 ° E MEAN TIME



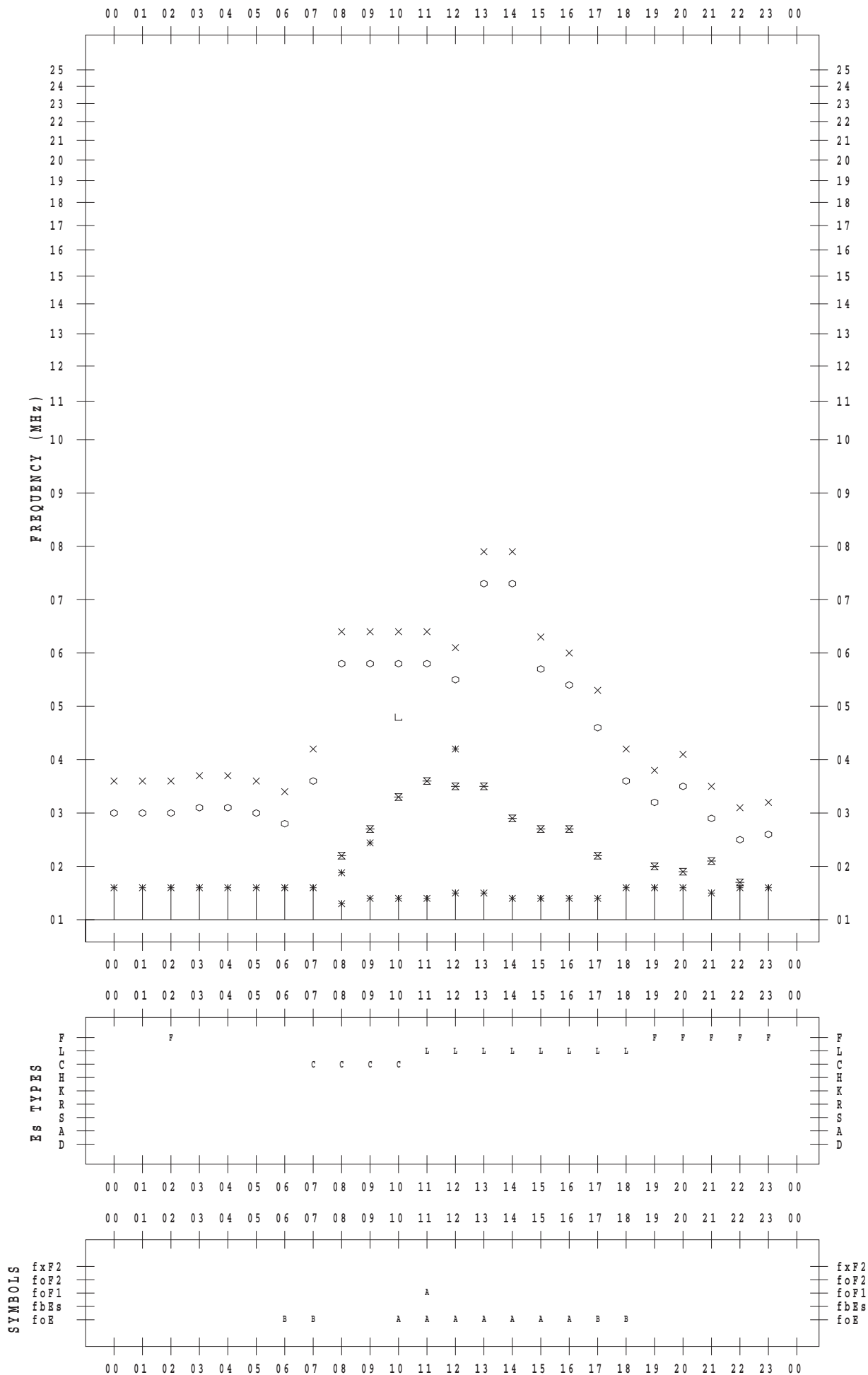
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/12

135 ° E MEAN TIME



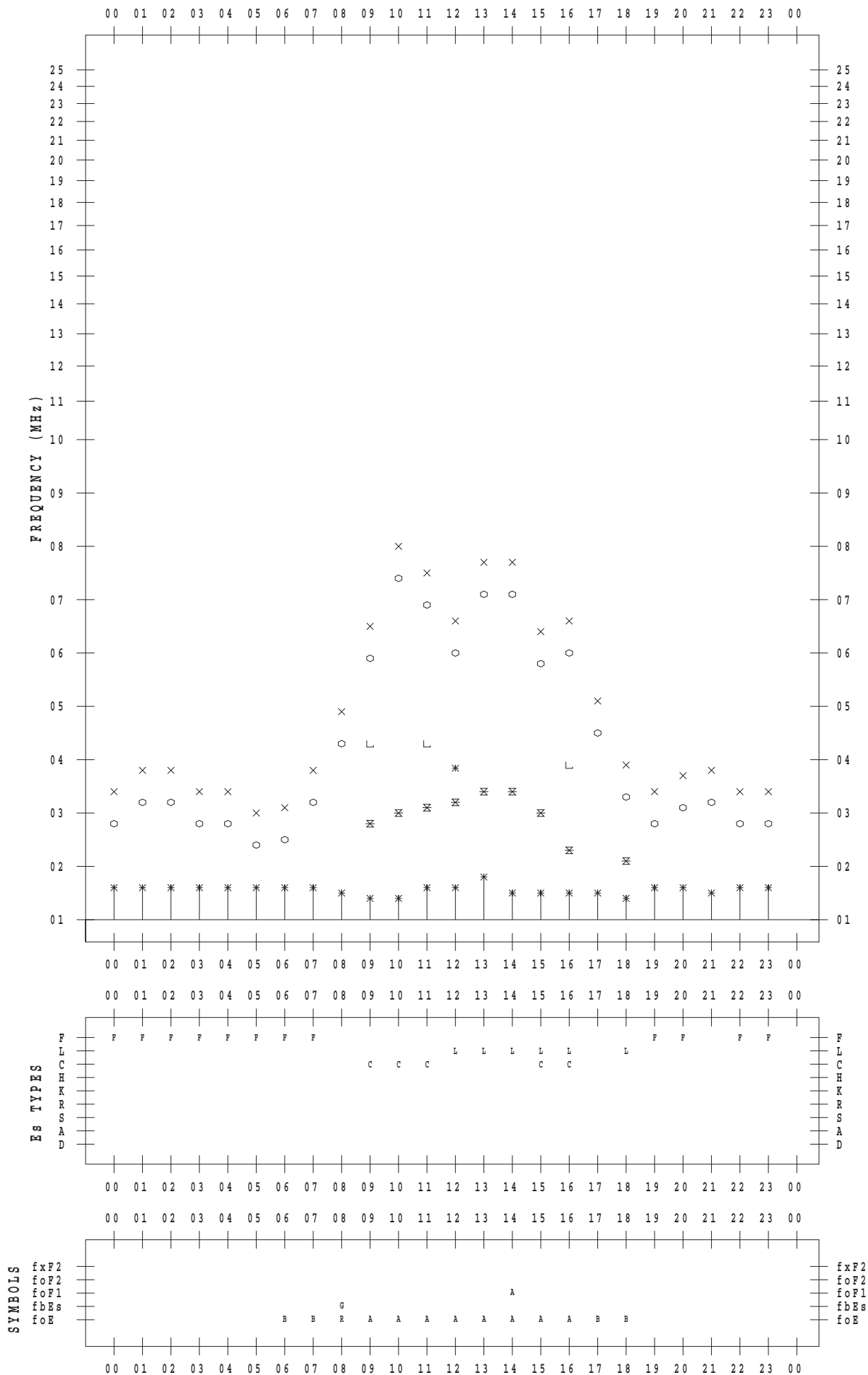
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/13

135 ° E MEAN TIME



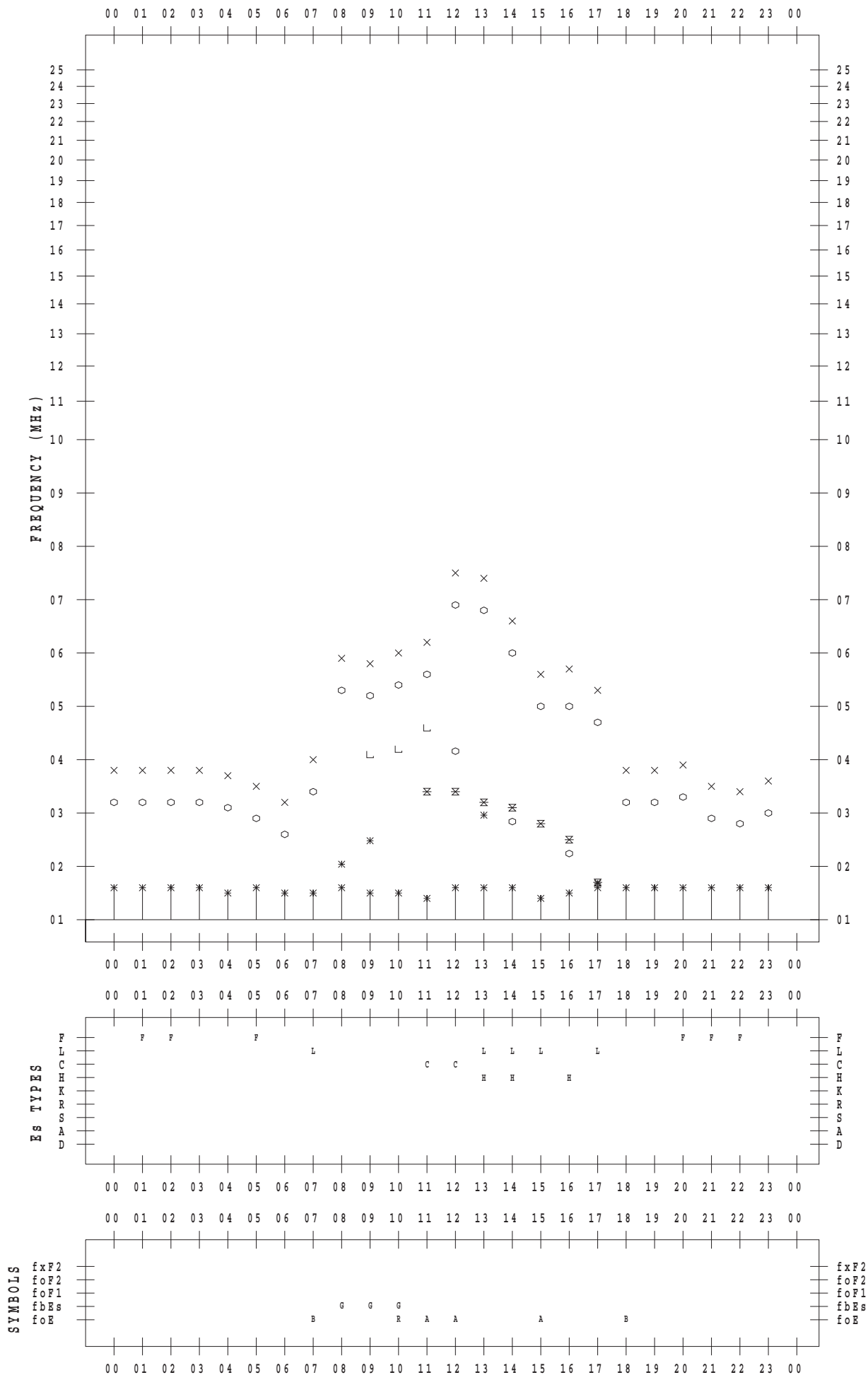
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/14

135 ° E MEAN TIME



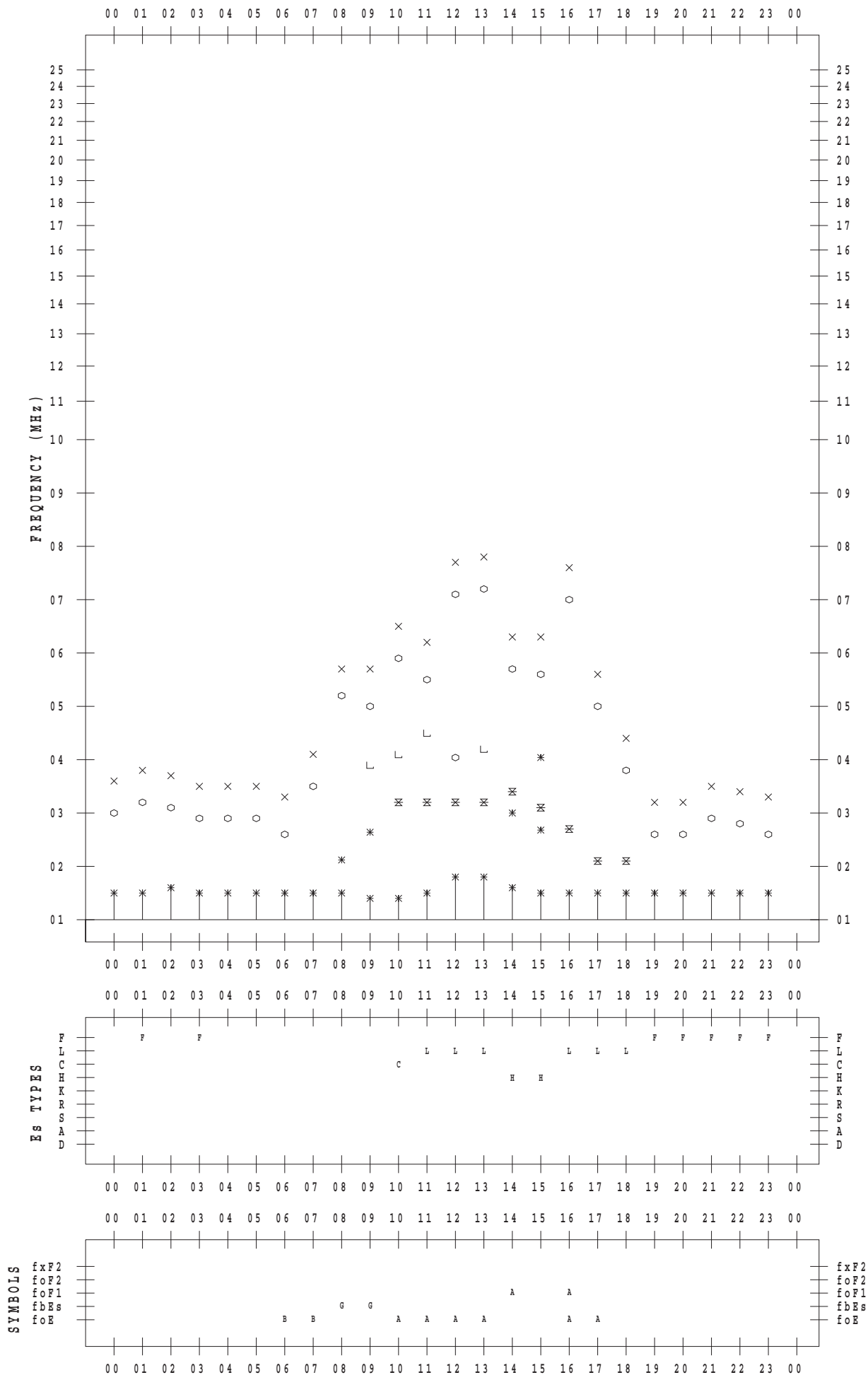
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/15

135 ° E MEAN TIME



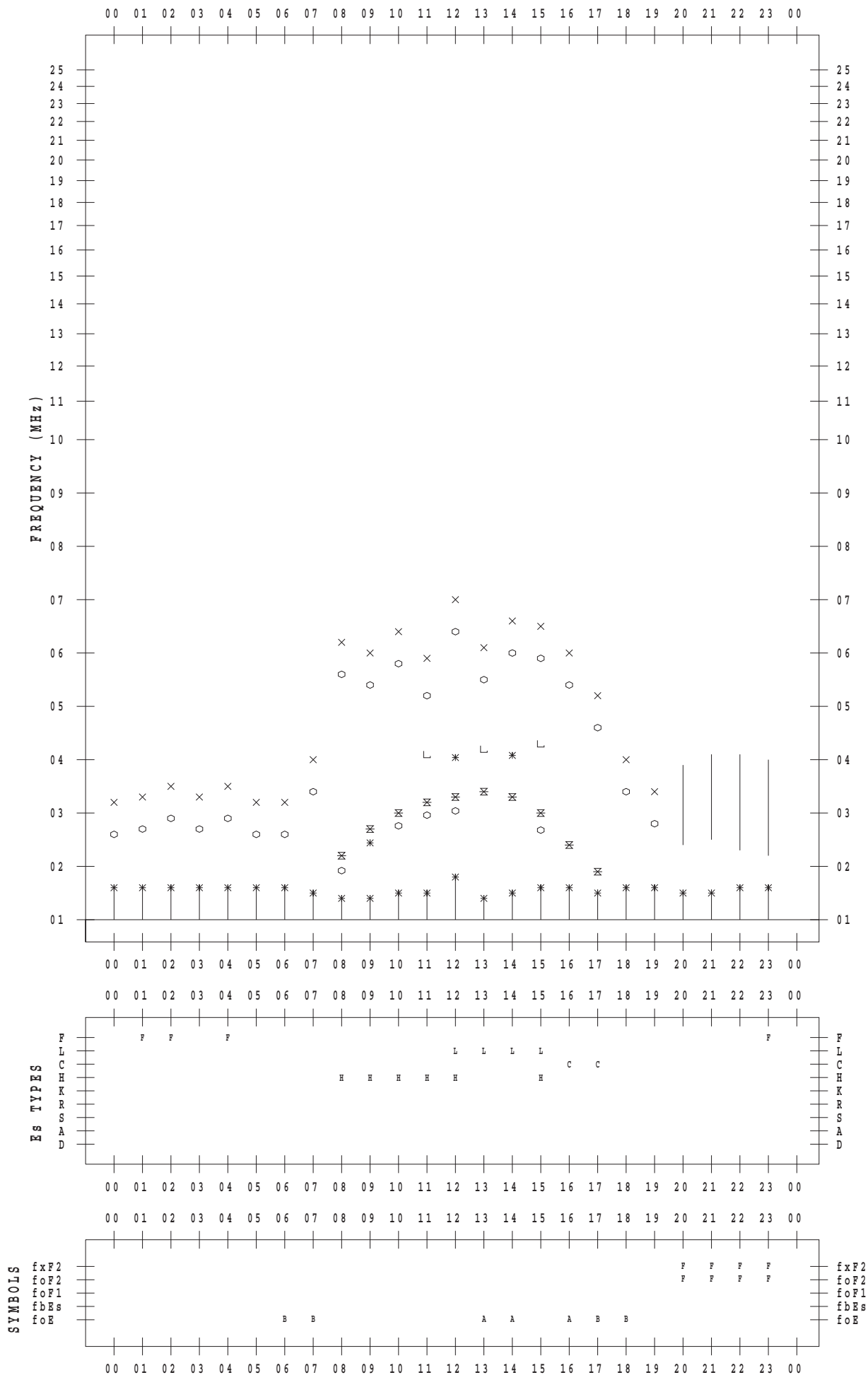
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/16

135 ° E MEAN TIME



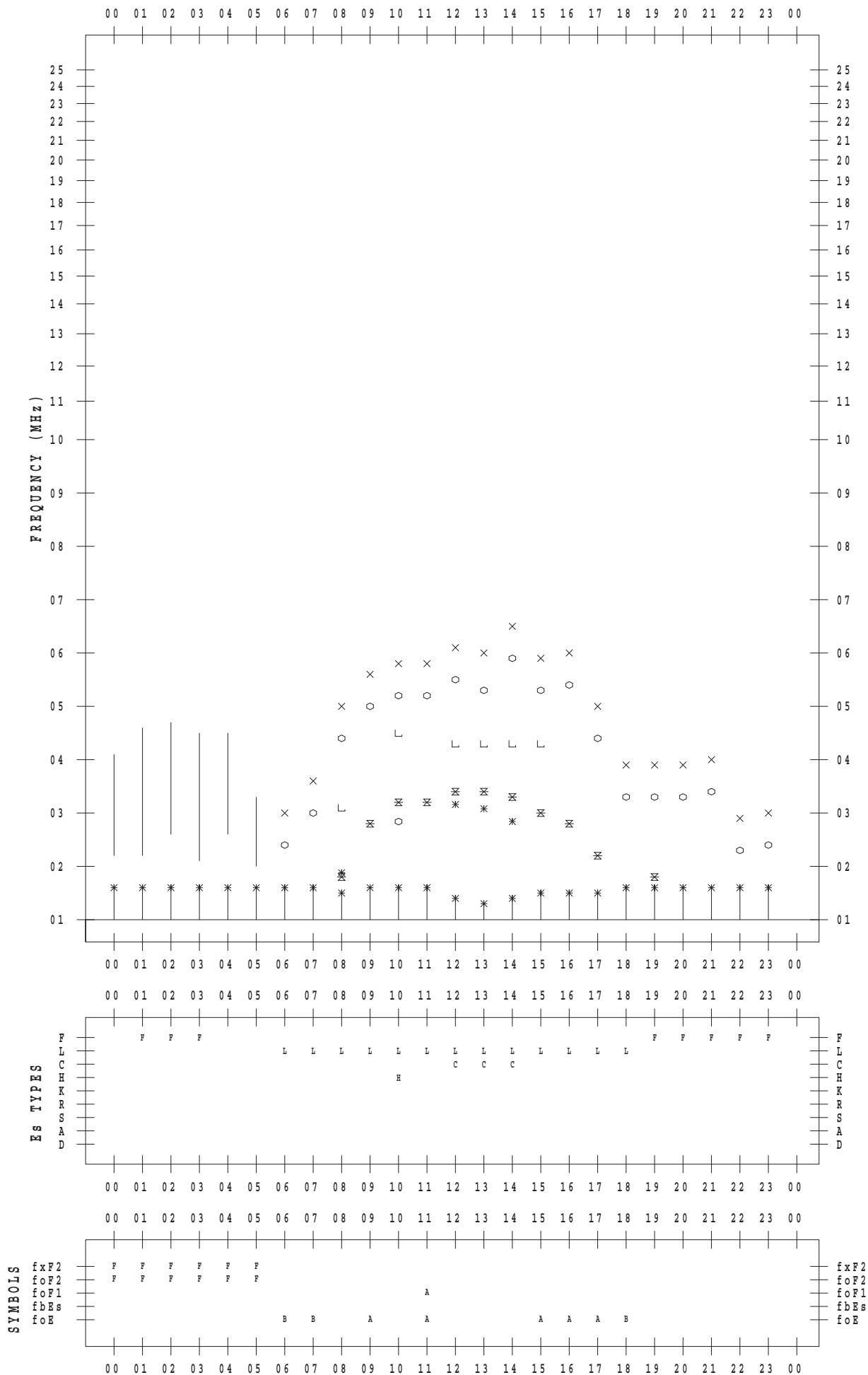
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/17

135 ° E MEAN TIME



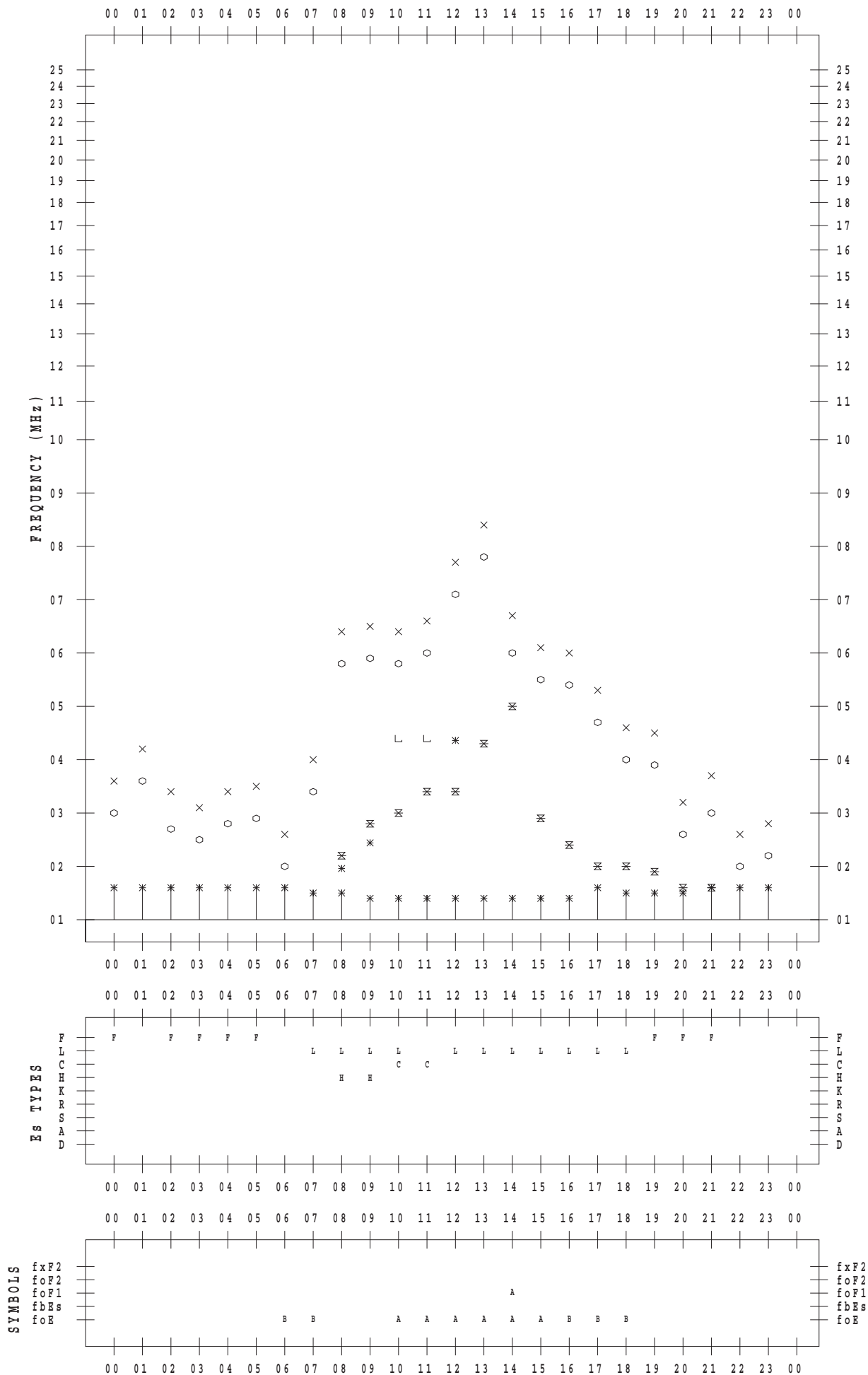
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/18

135 ° E MEAN TIME



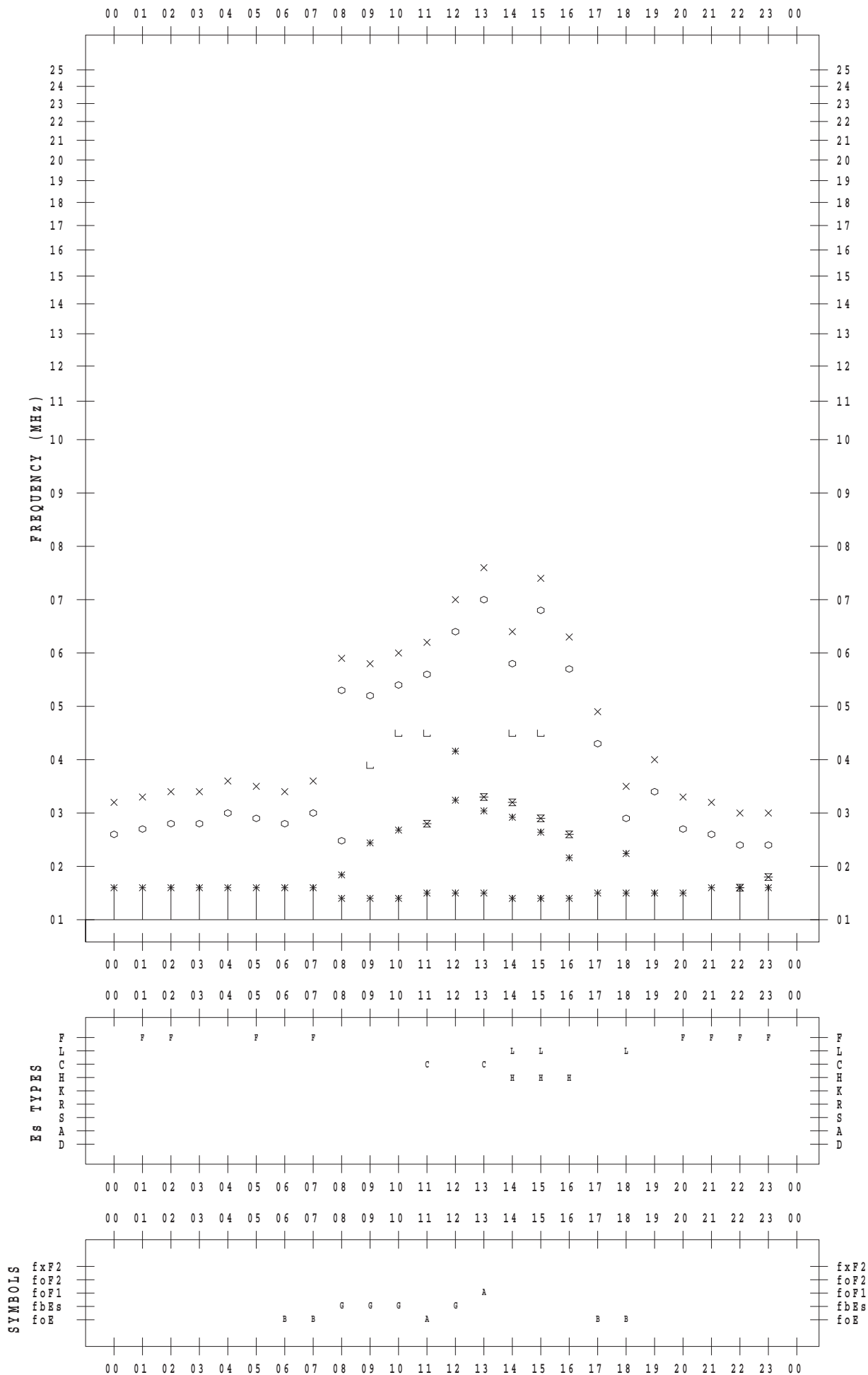
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SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/19

135 ° E MEAN TIME



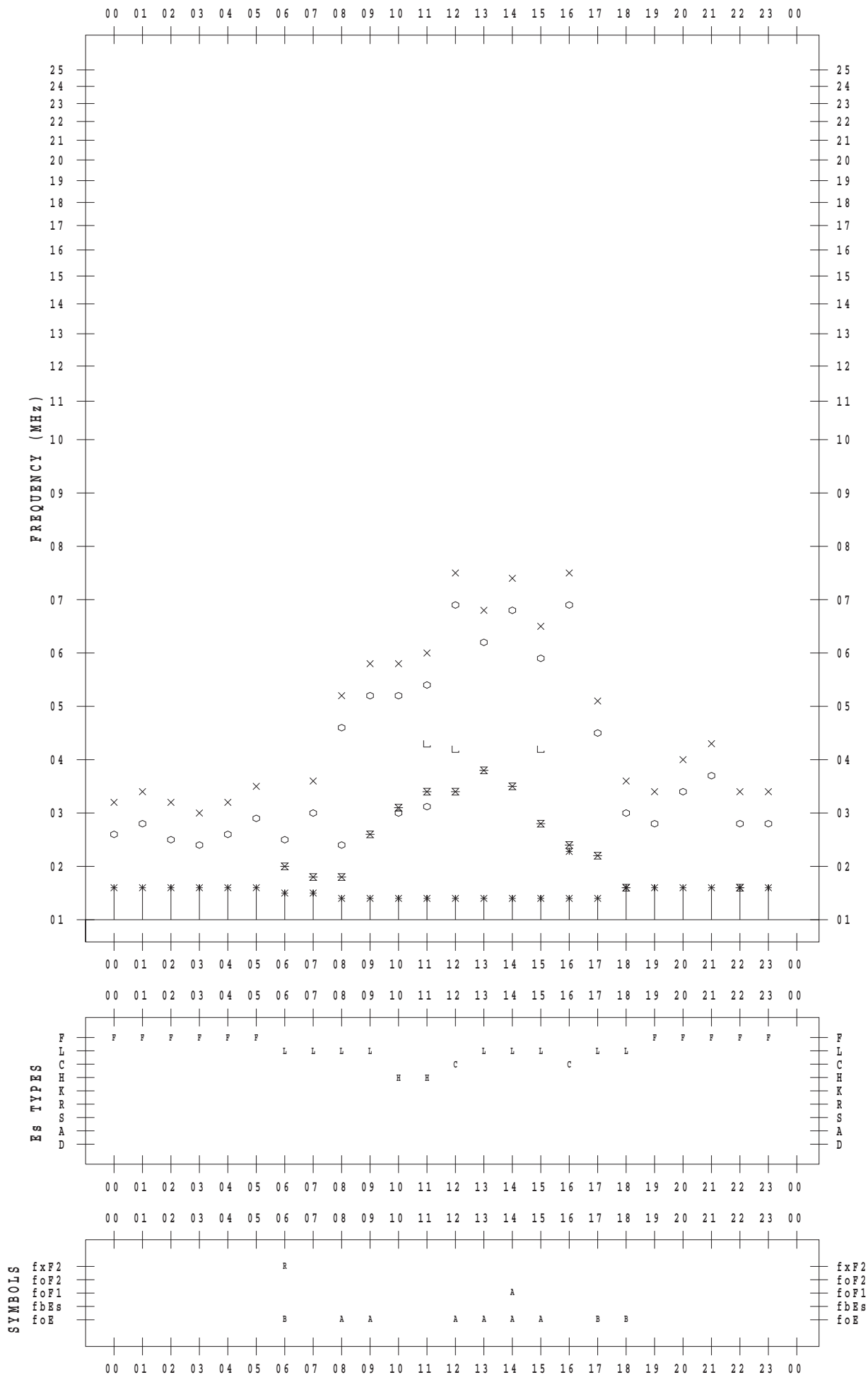
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/20

135 ° E MEAN TIME



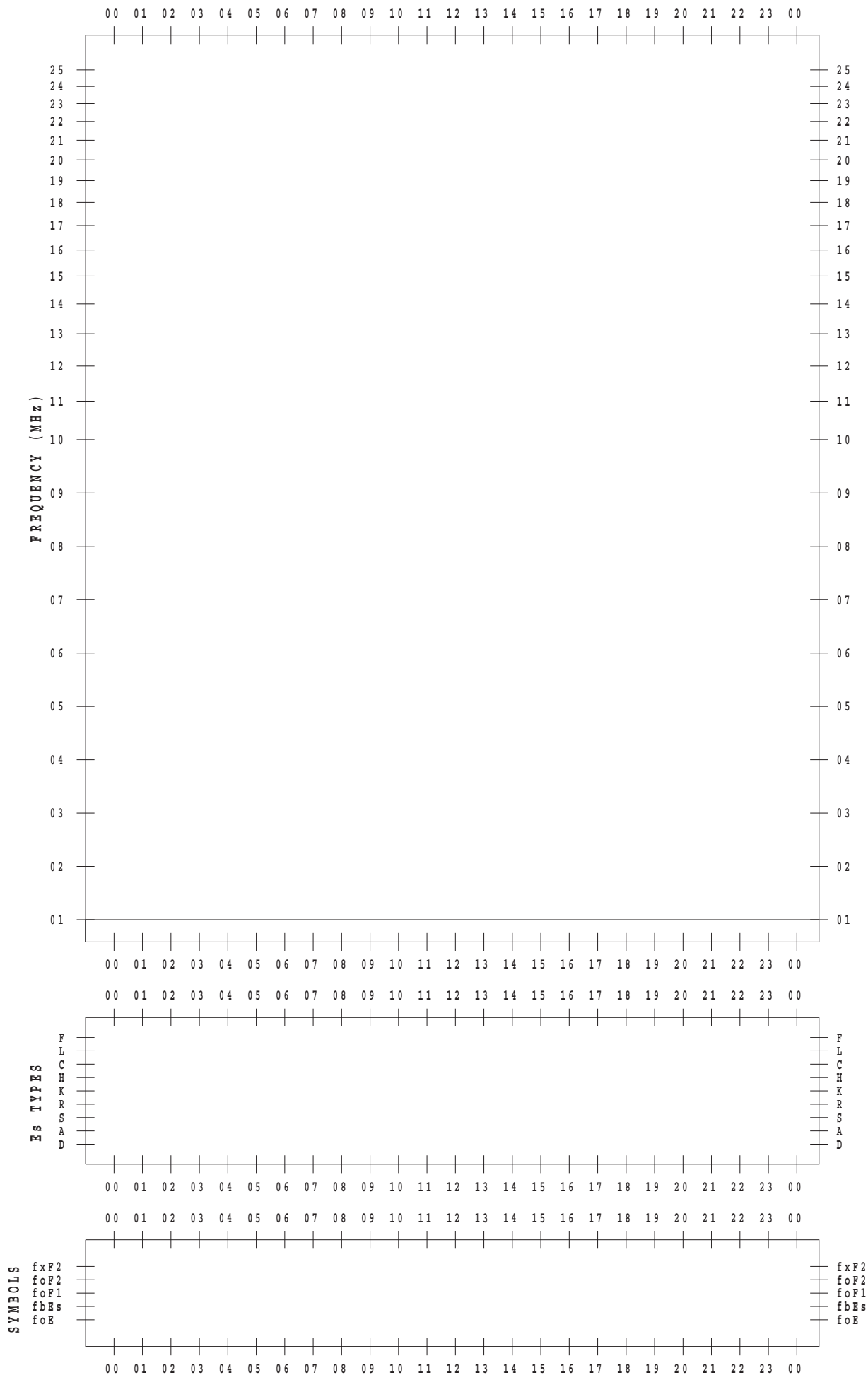
f - PLOT DATA

SCALER :

STATION : Yamagawa

DATE : 2017/12/21

135 ° E MEAN TIME



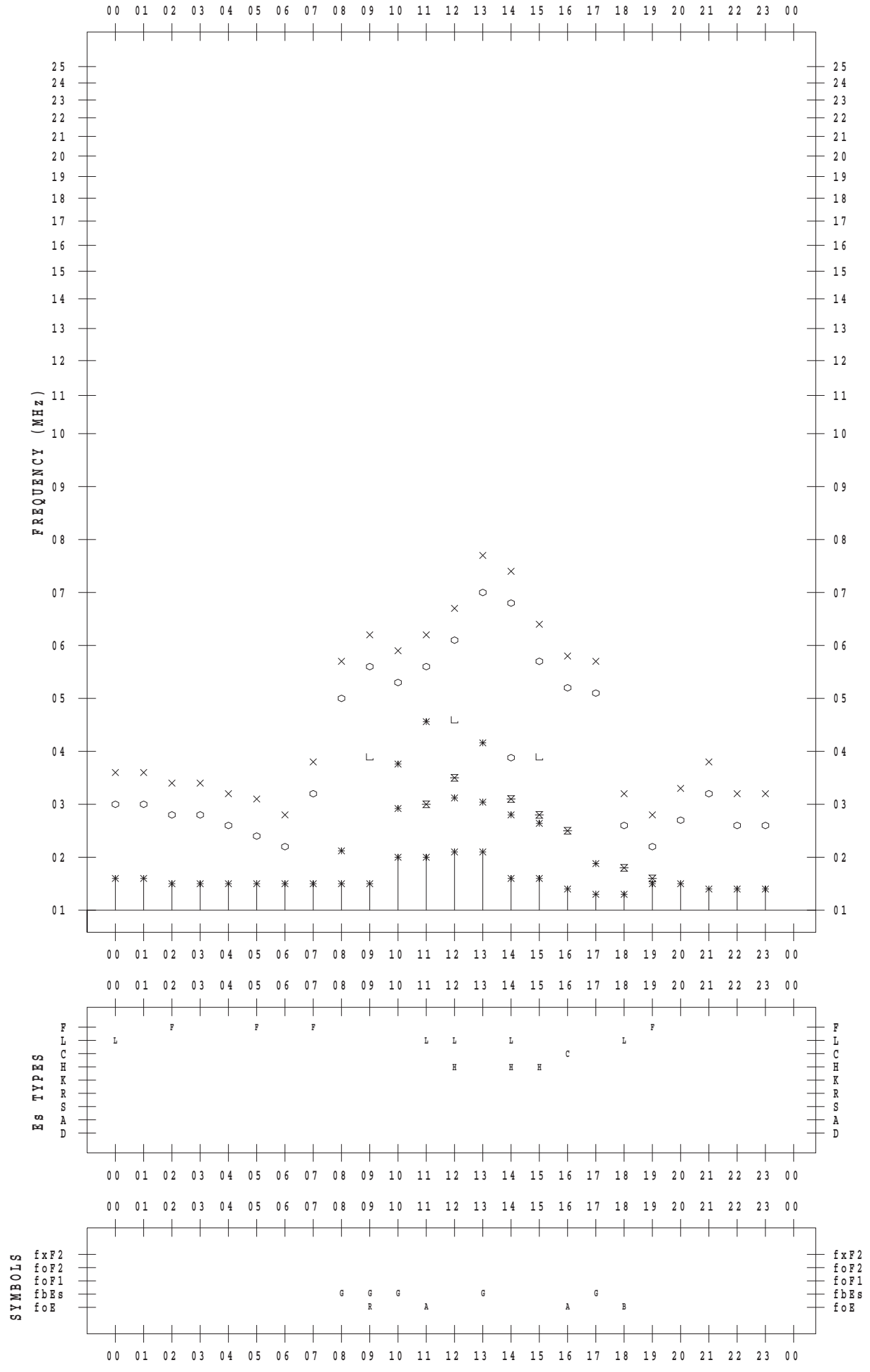
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/22

135 ° E MEAN TIME



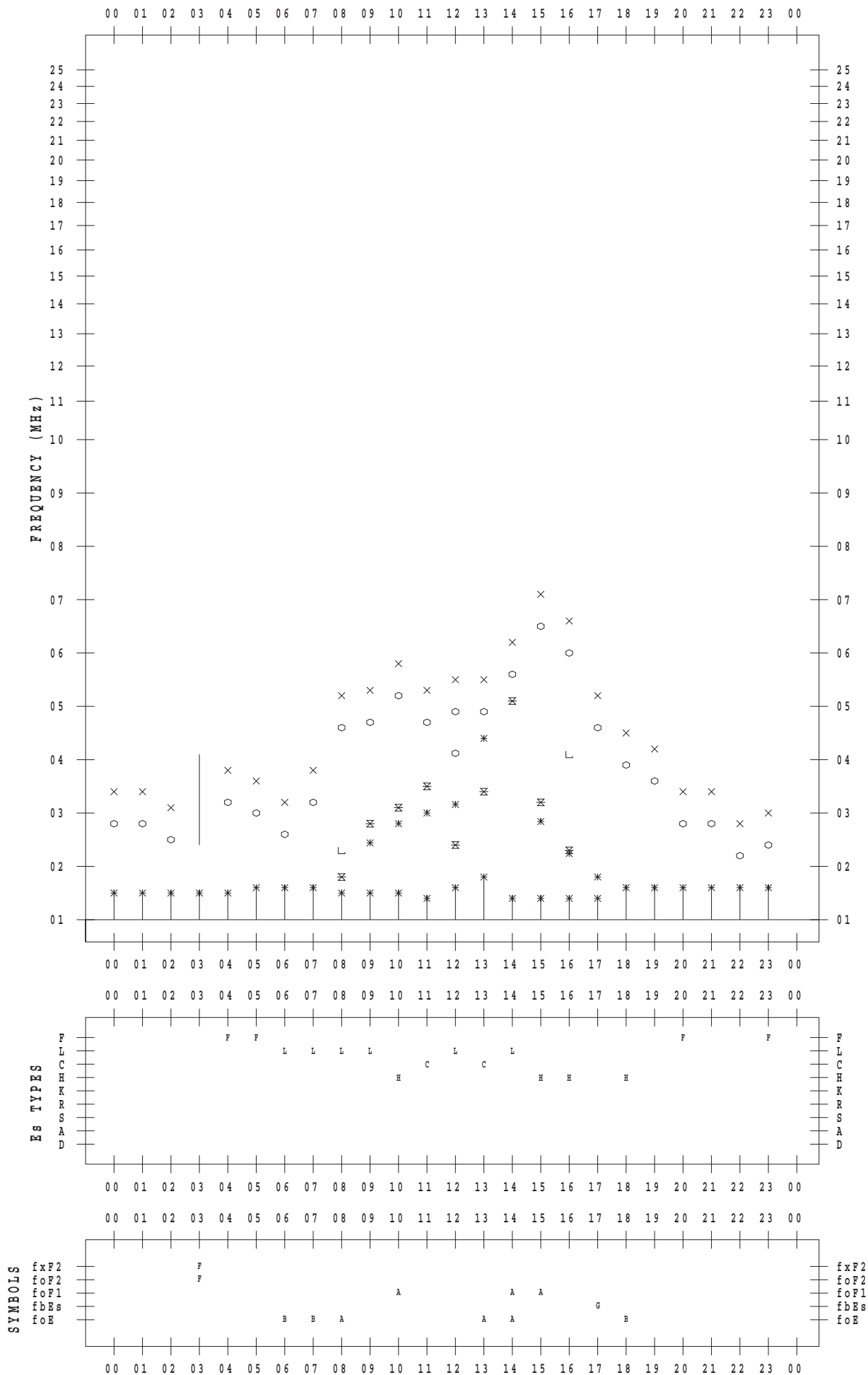
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/23

135 ° E MEAN TIME



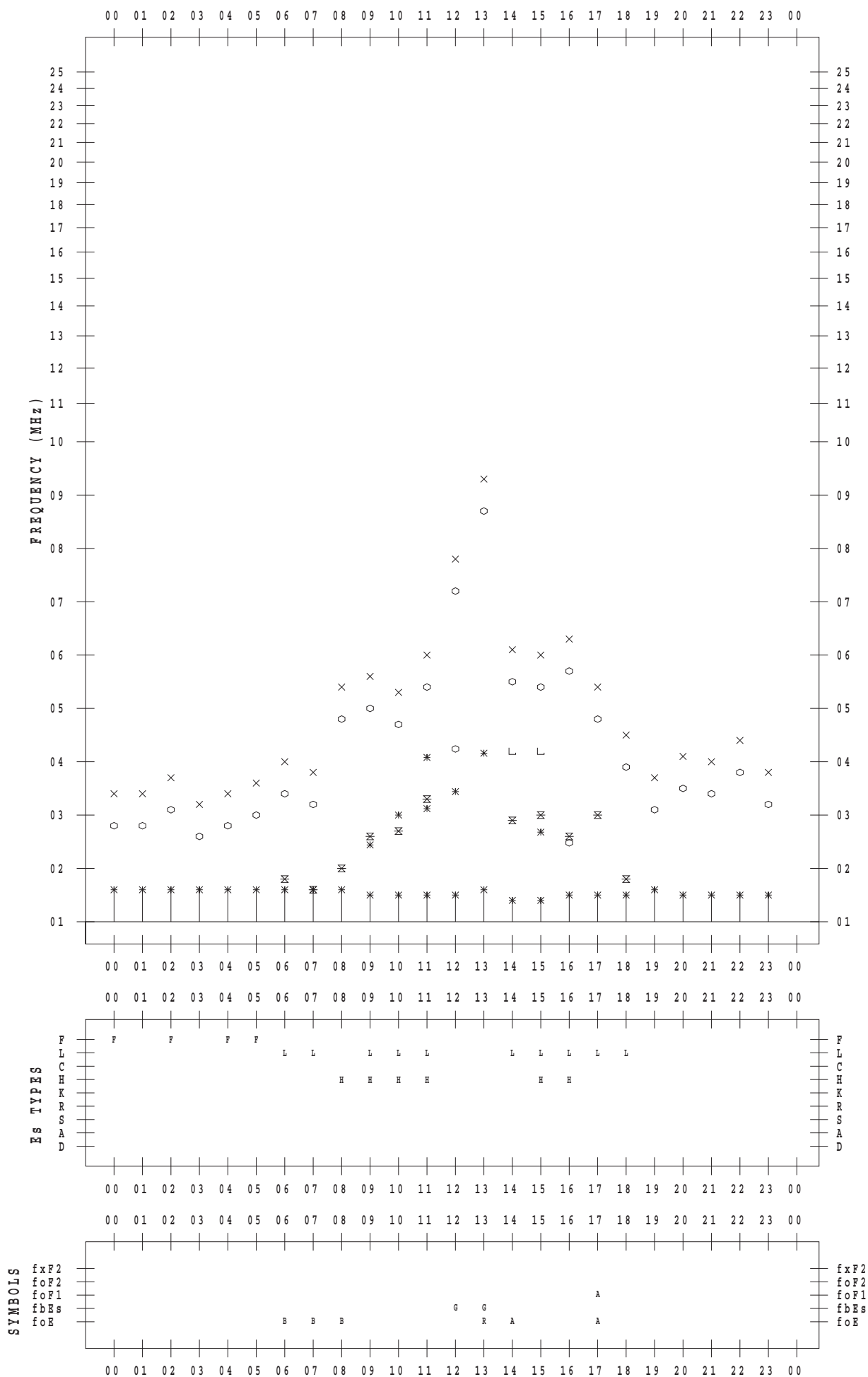
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/24

135 ° E MEAN TIME



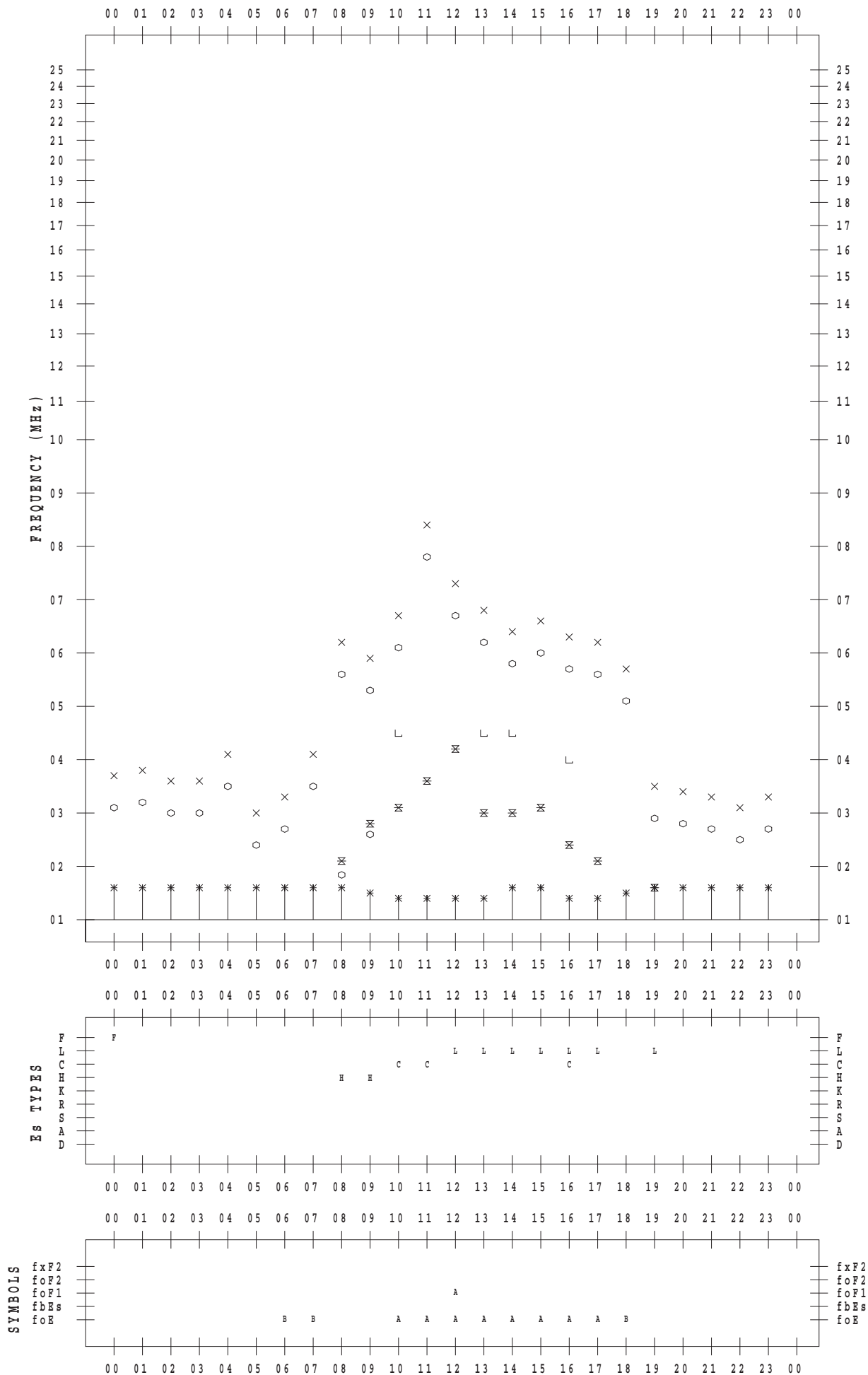
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/25

135 ° E MEAN TIME



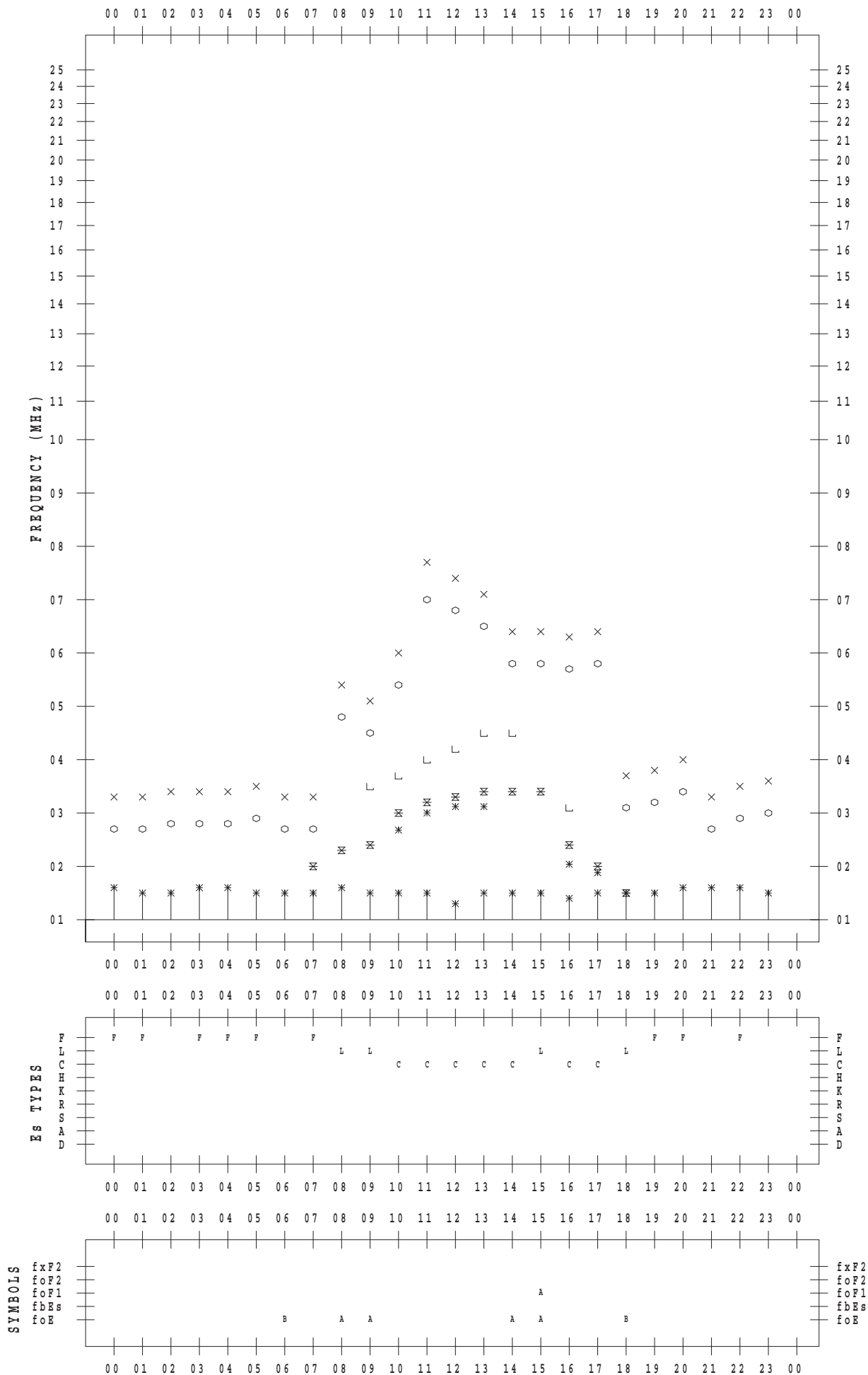
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/26

135 ° E MEAN TIME



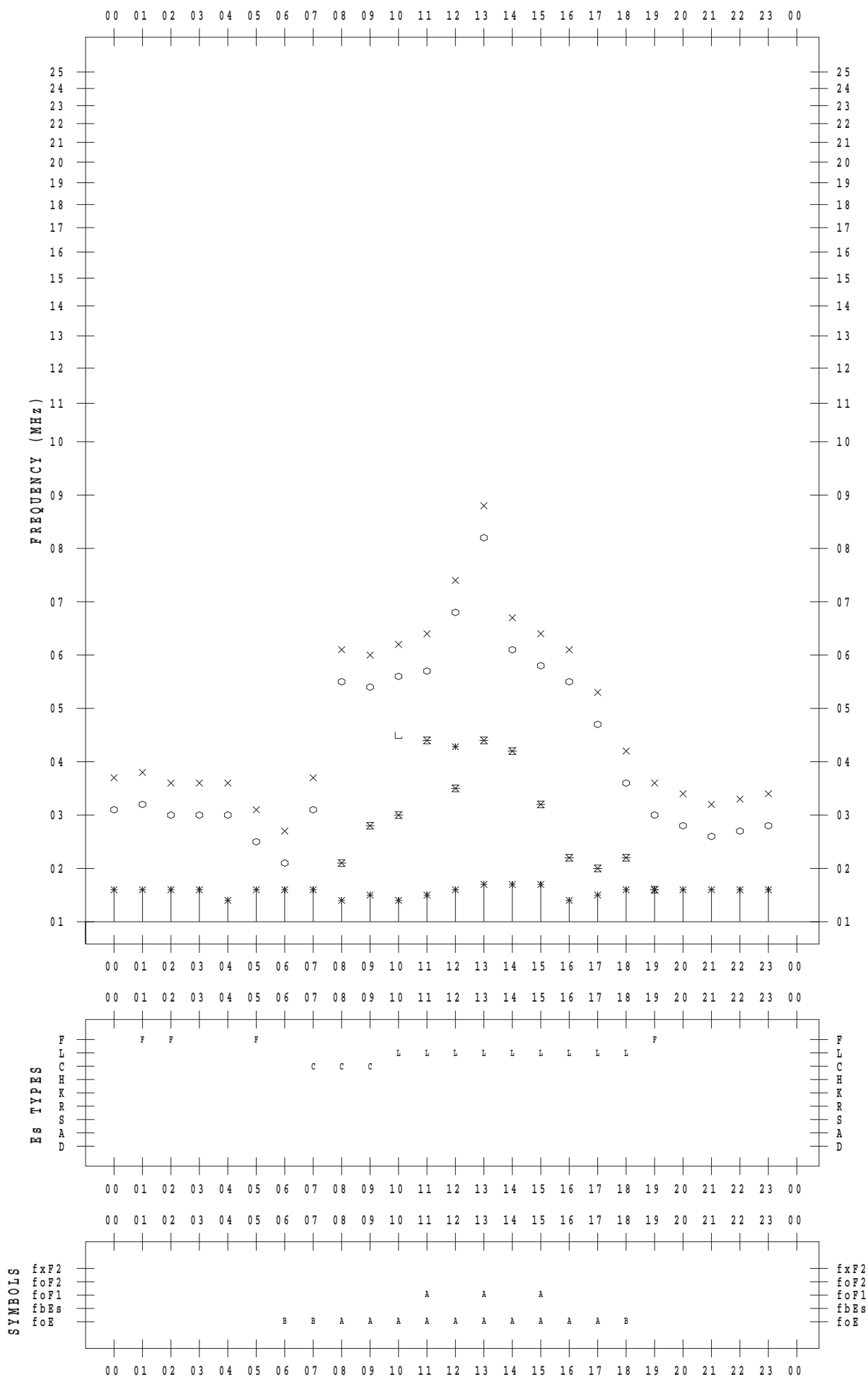
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/27

135 ° E MEAN TIME



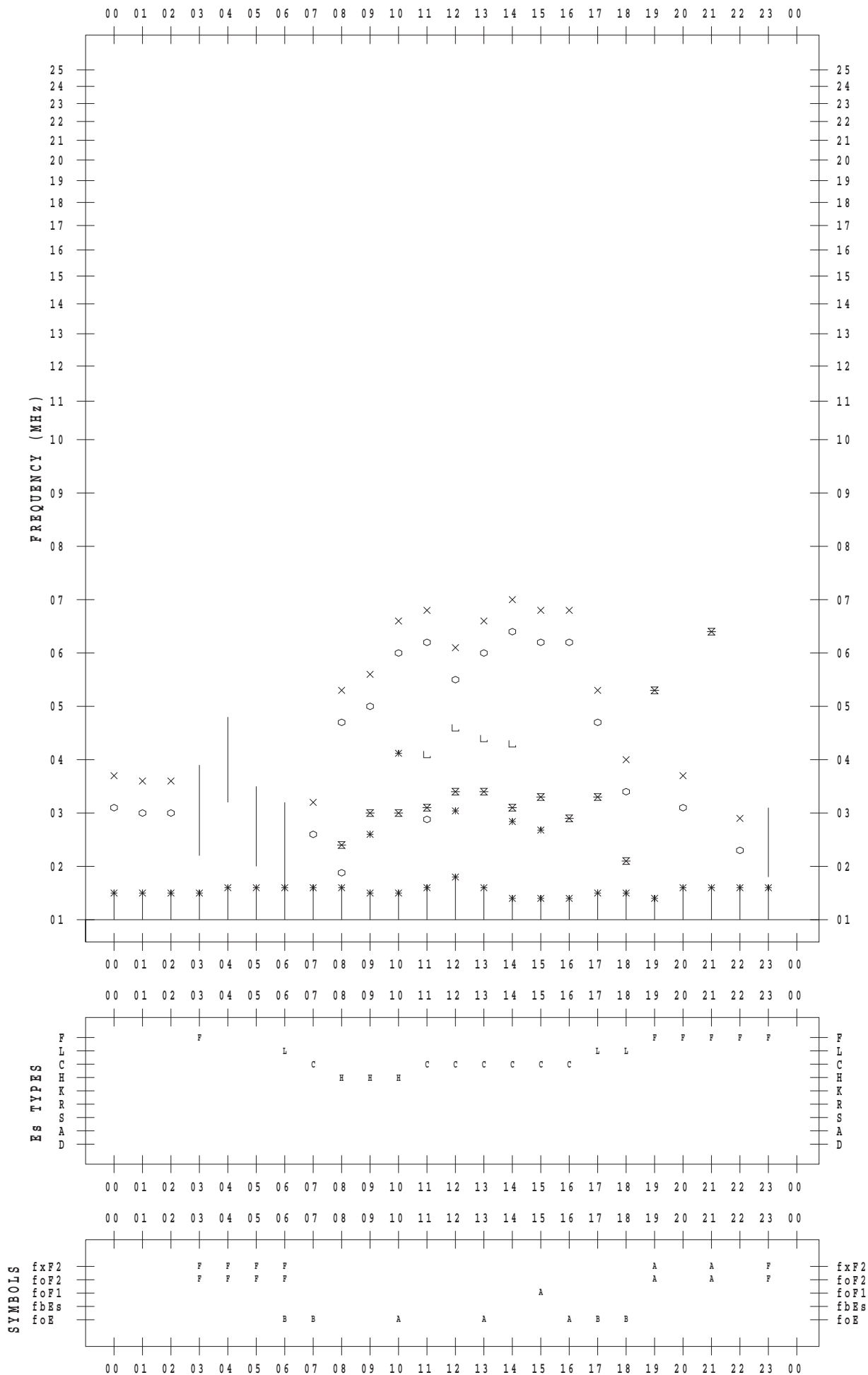
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/28

135 ° E MEAN TIME



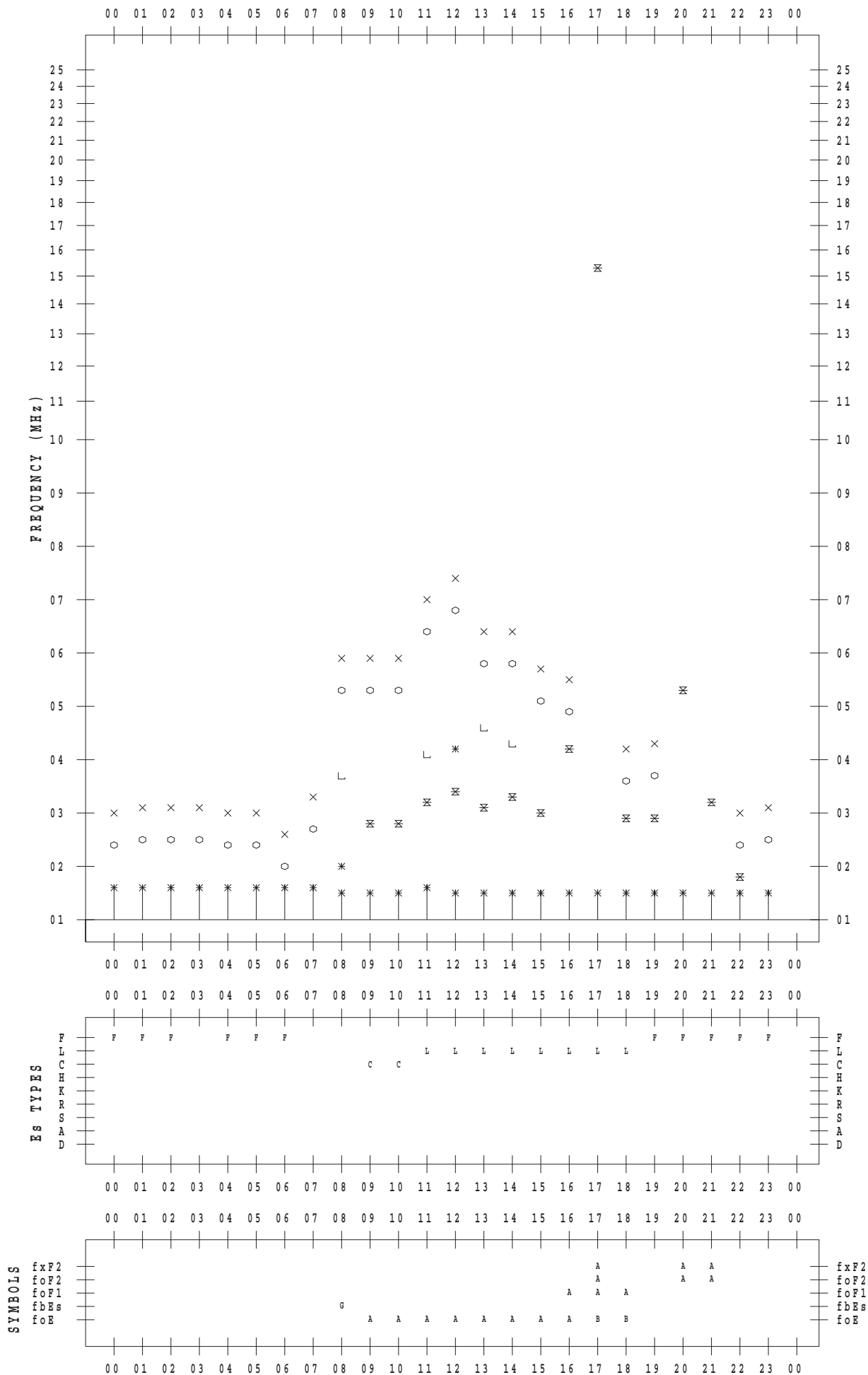
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/29

135 ° E MEAN TIME



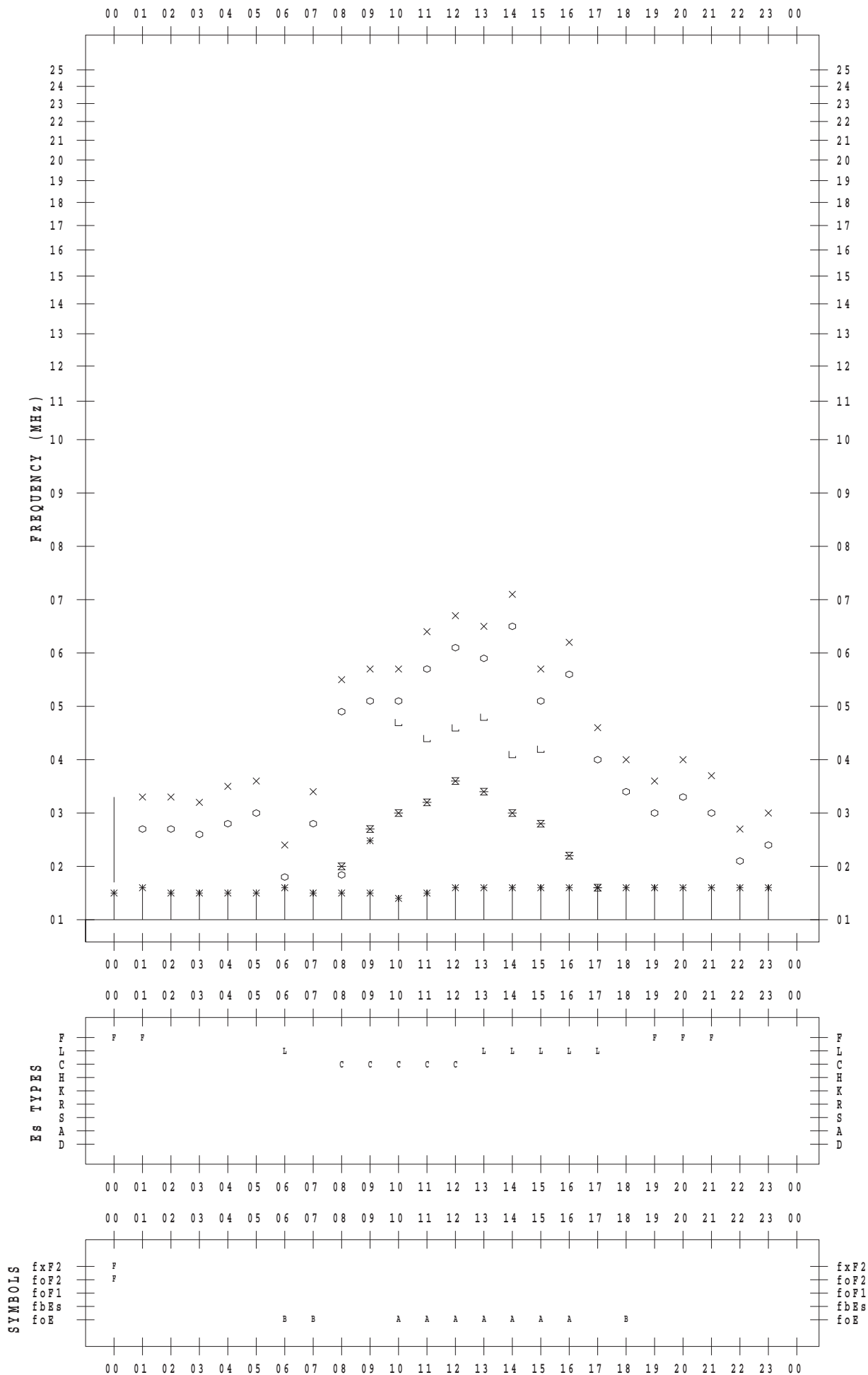
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/30

135 ° E MEAN TIME



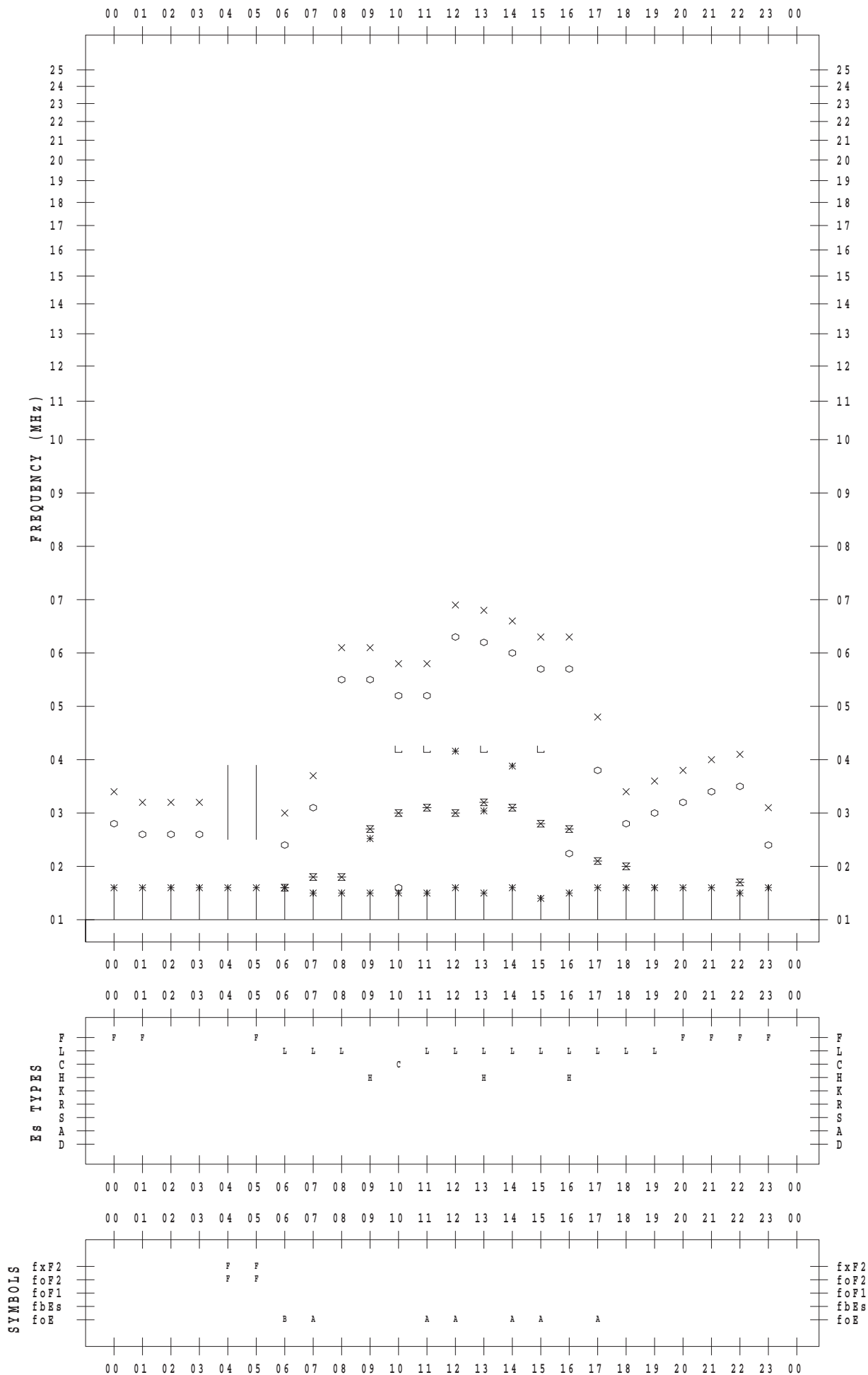
f - PLOT DATA

SCALER : I.NISHIMUTA

STATION : Yamagawa

DATE : 2017/12/31

135 ° E MEAN TIME



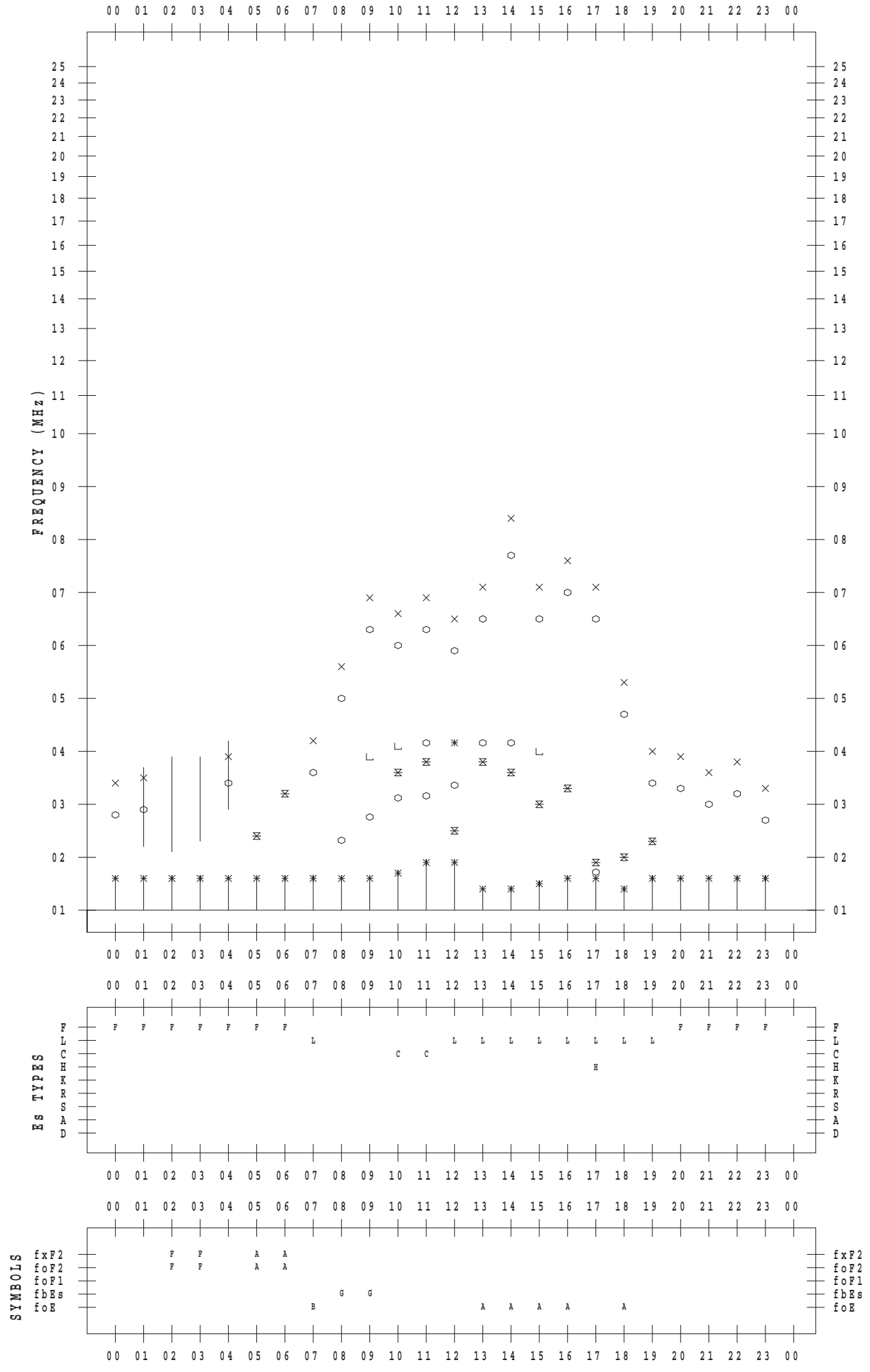
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 1

135 ° E MEAN TIME



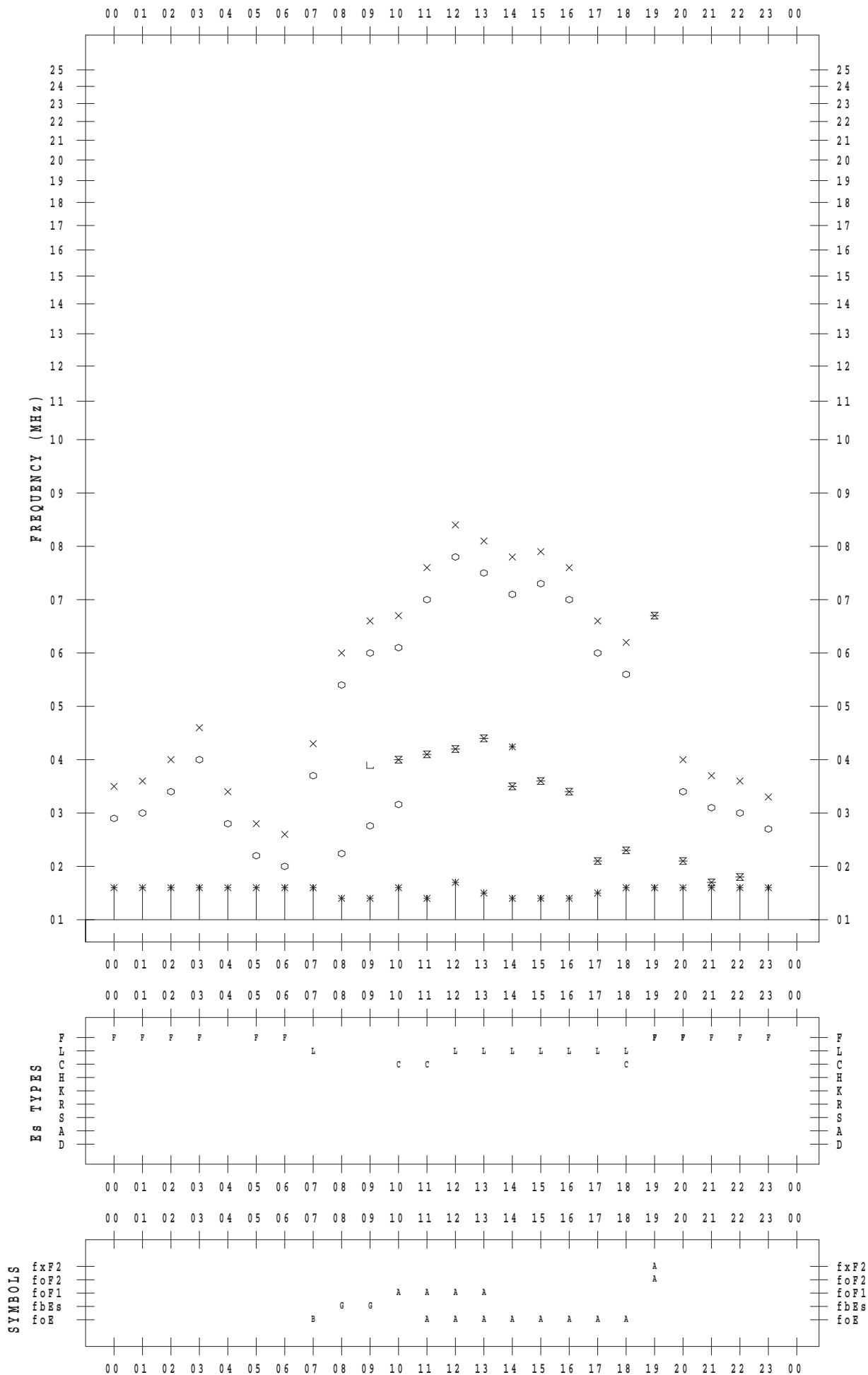
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 2

135 ° E MEAN TIME



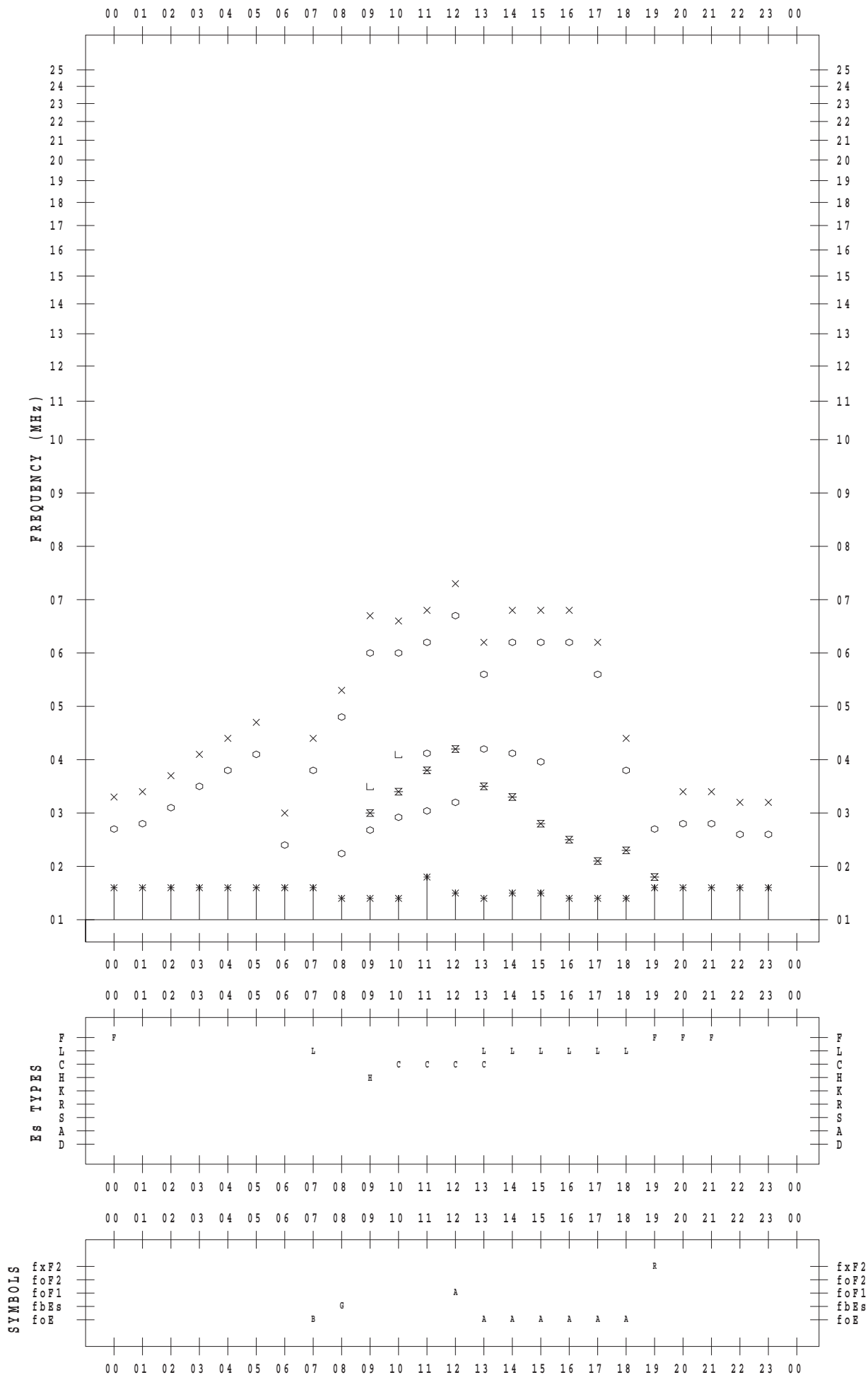
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 3

135 ° E MEAN TIME



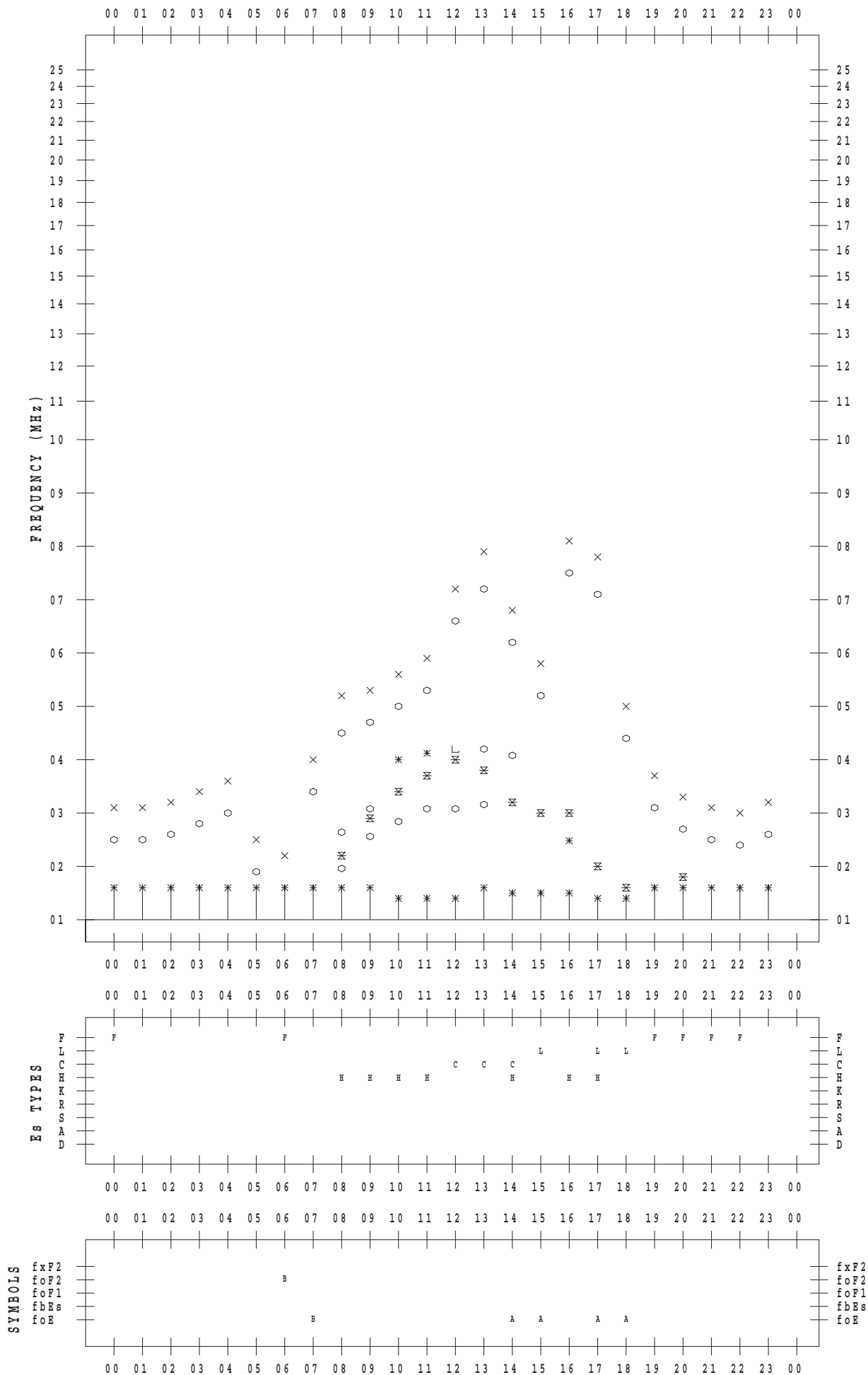
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 4

135 ° E MEAN TIME



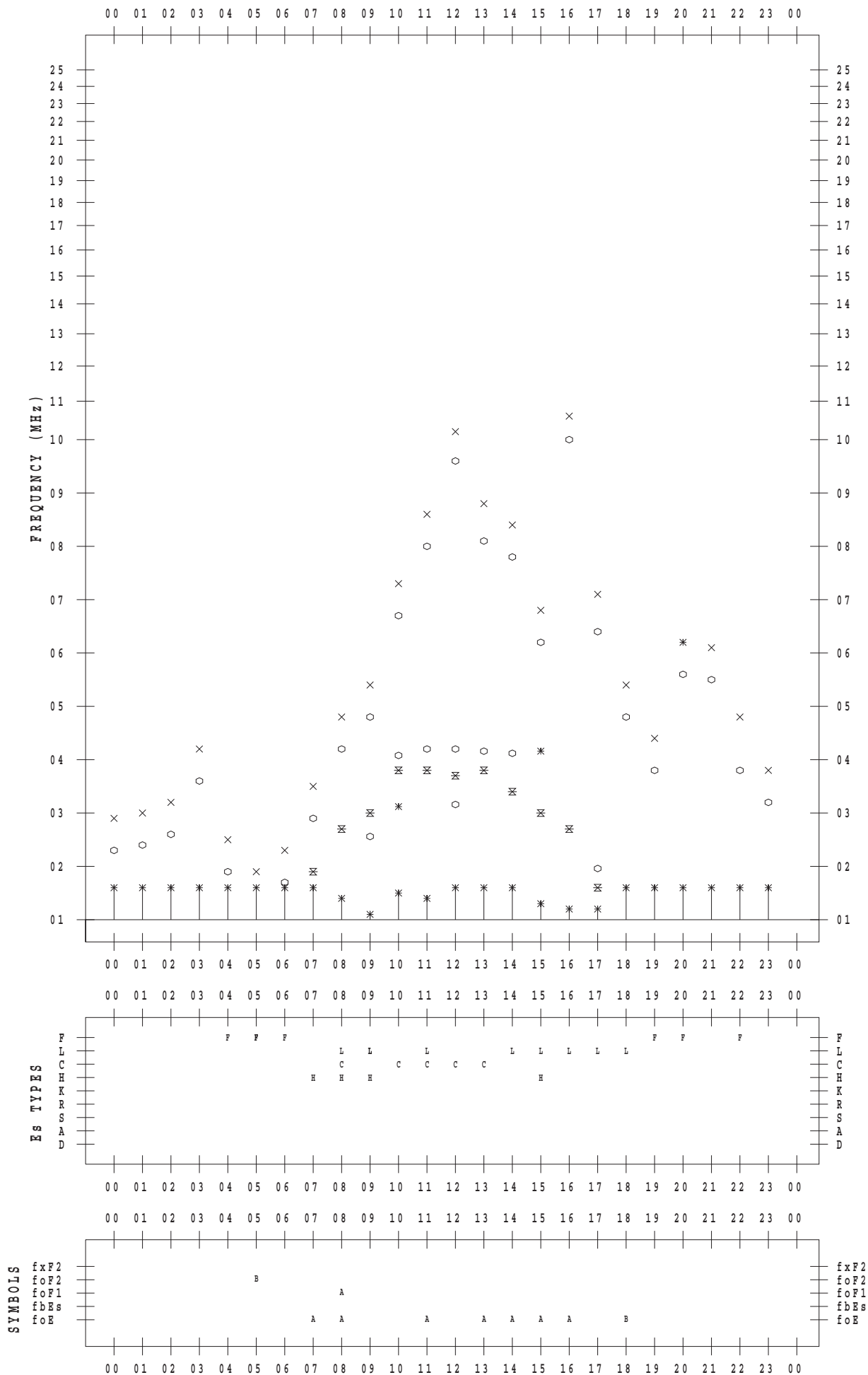
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 5

135 ° E MEAN TIME



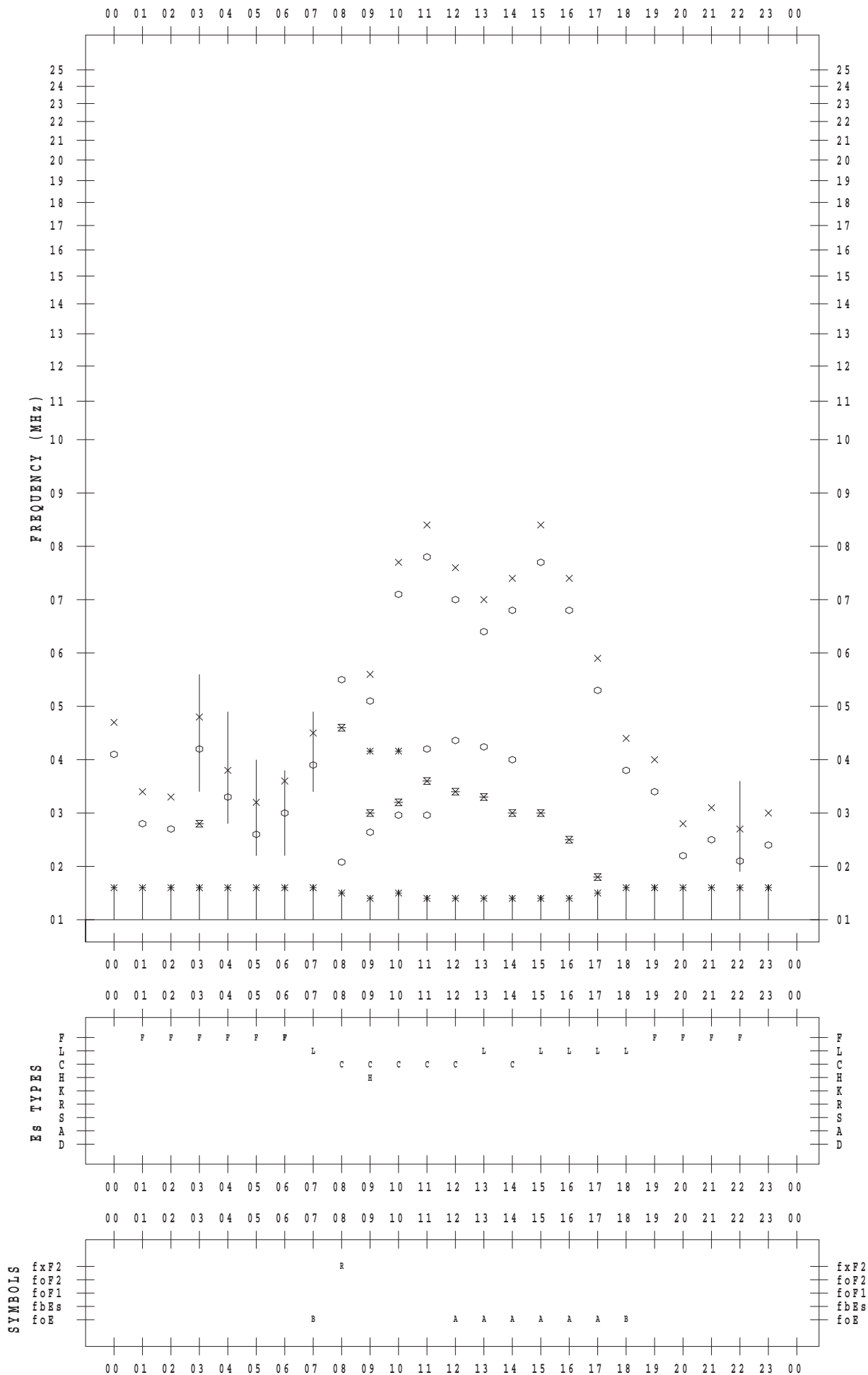
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 6

135 ° E MEAN TIME



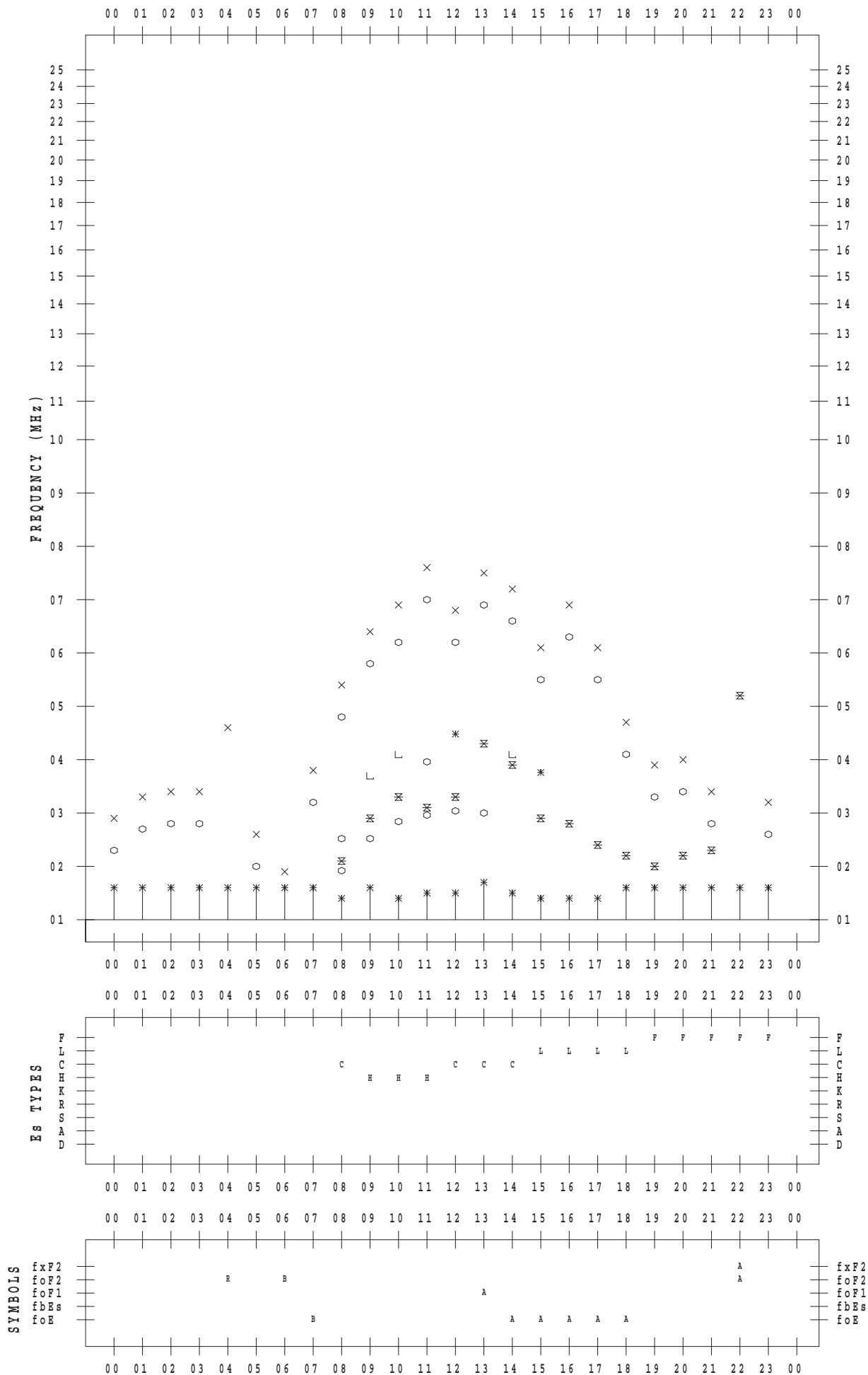
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 7

135 ° E MEAN TIME



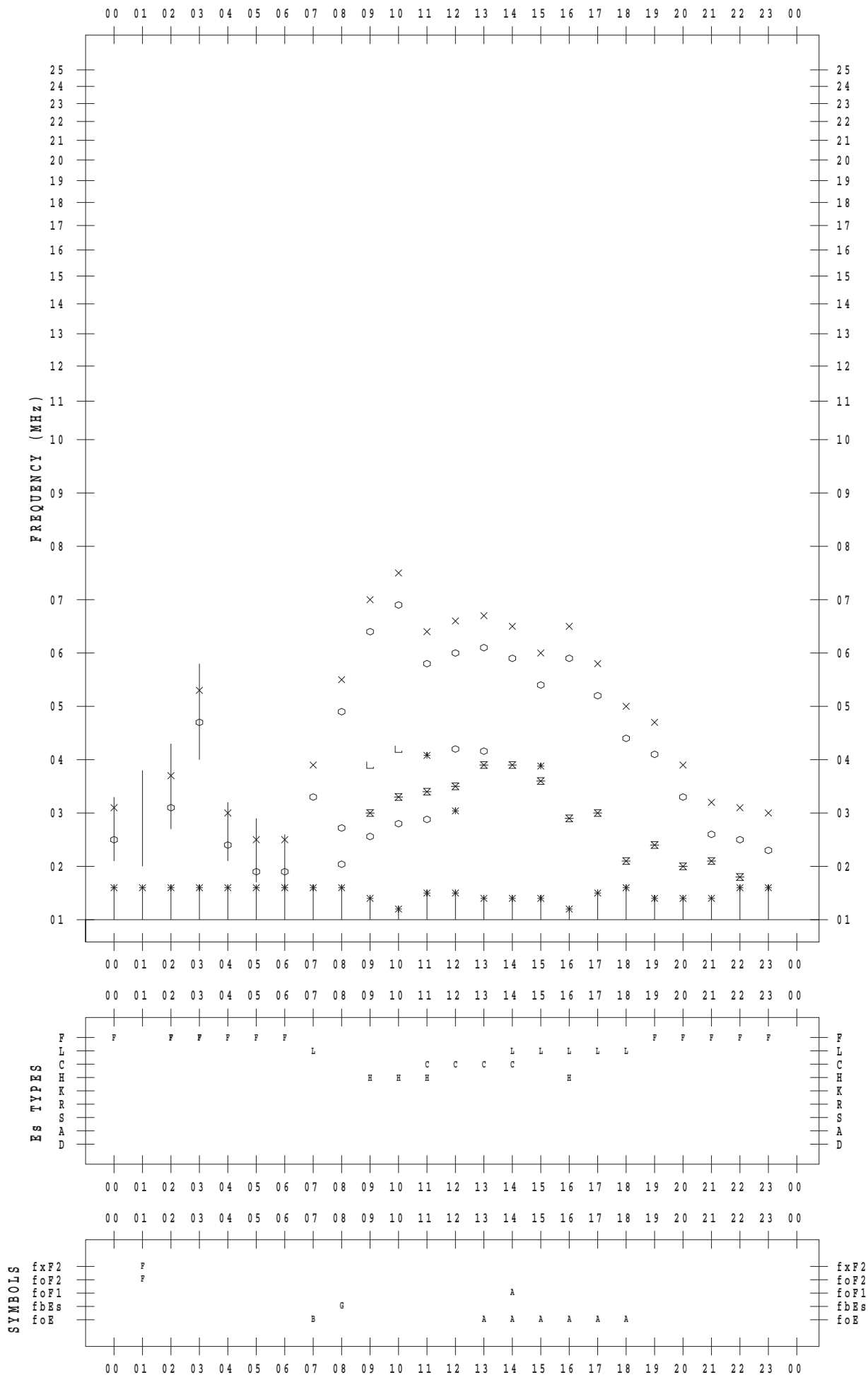
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 8

135 ° E MEAN TIME



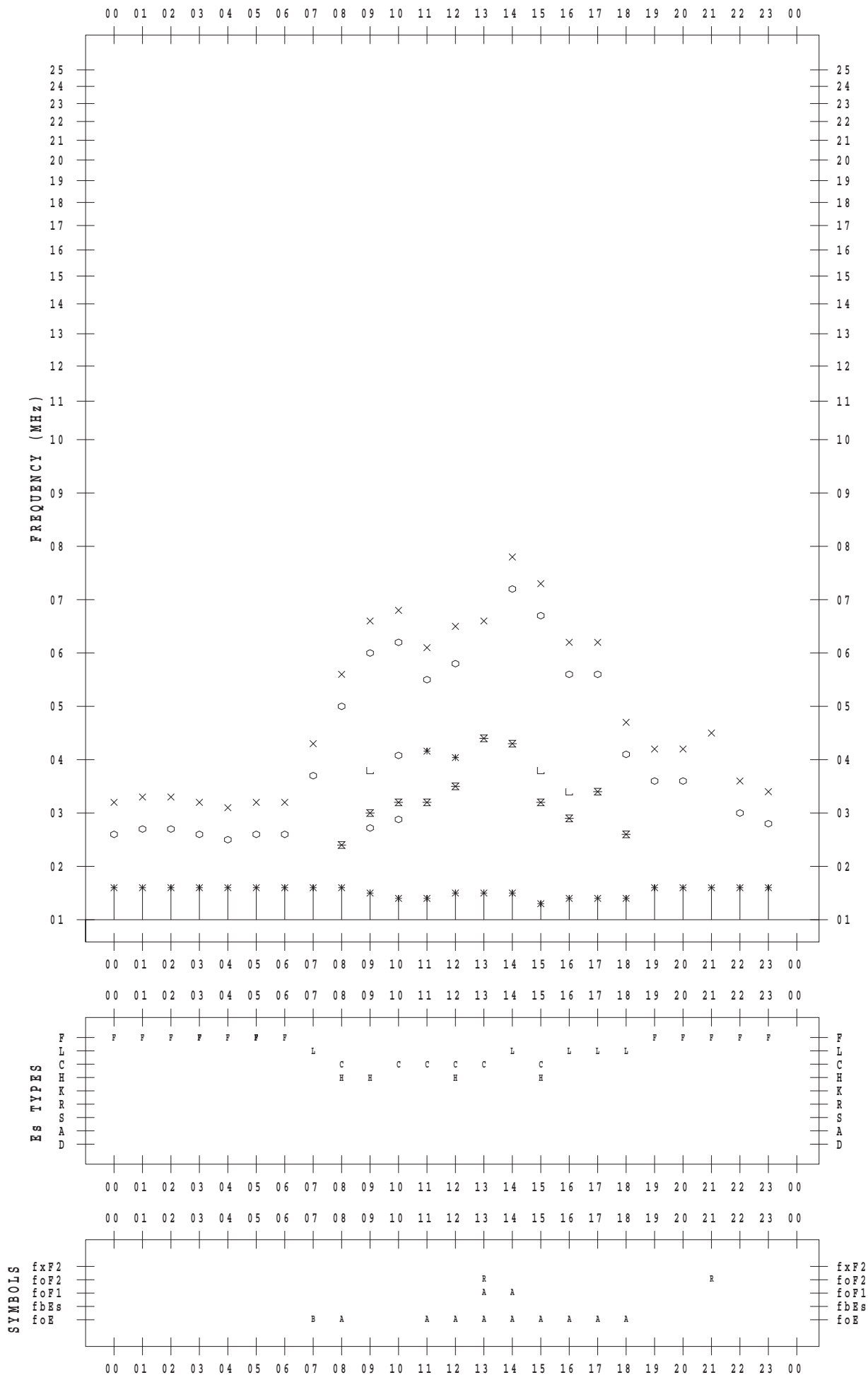
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/ 9

135 ° E MEAN TIME



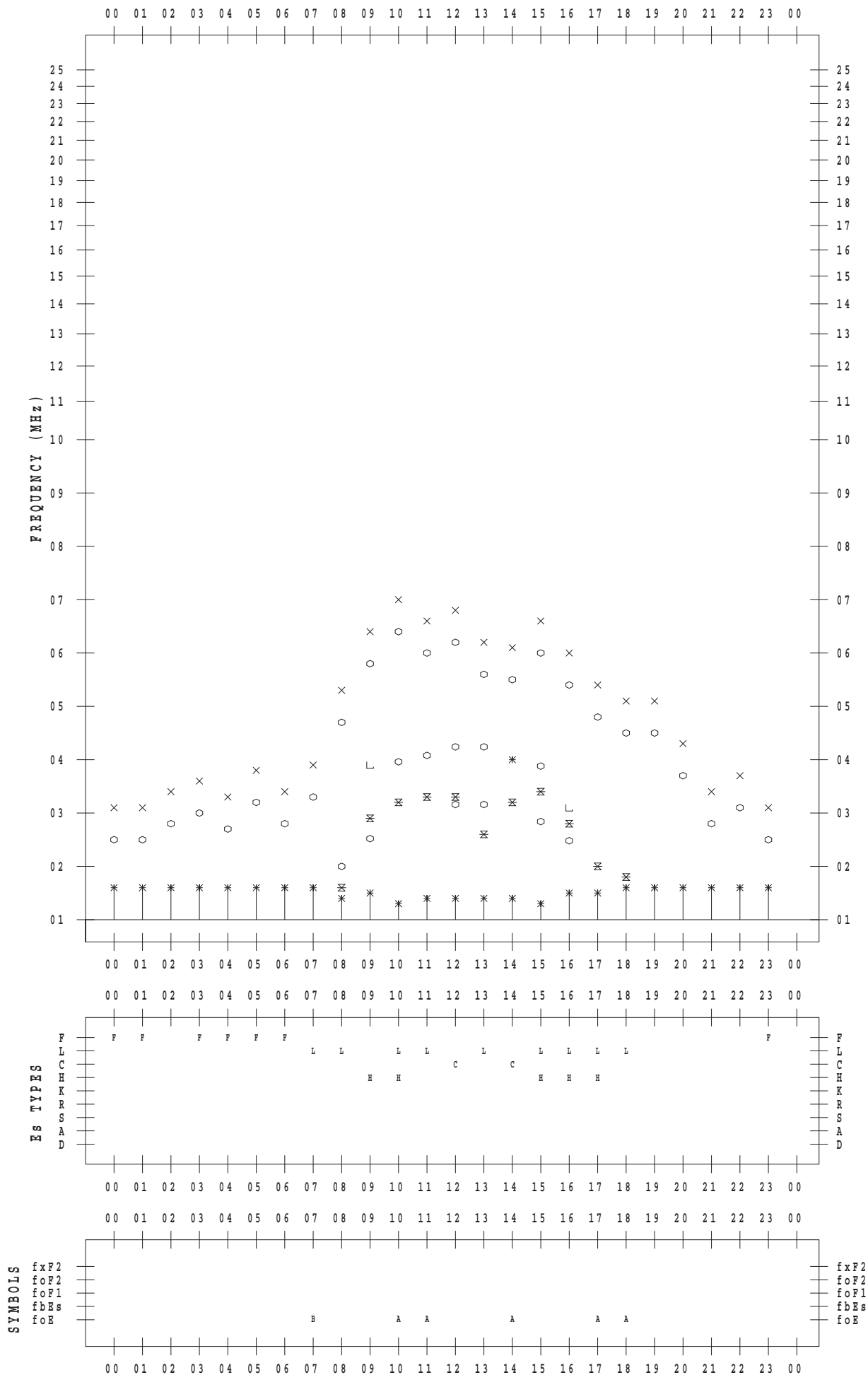
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/10

135 ° E MEAN TIME



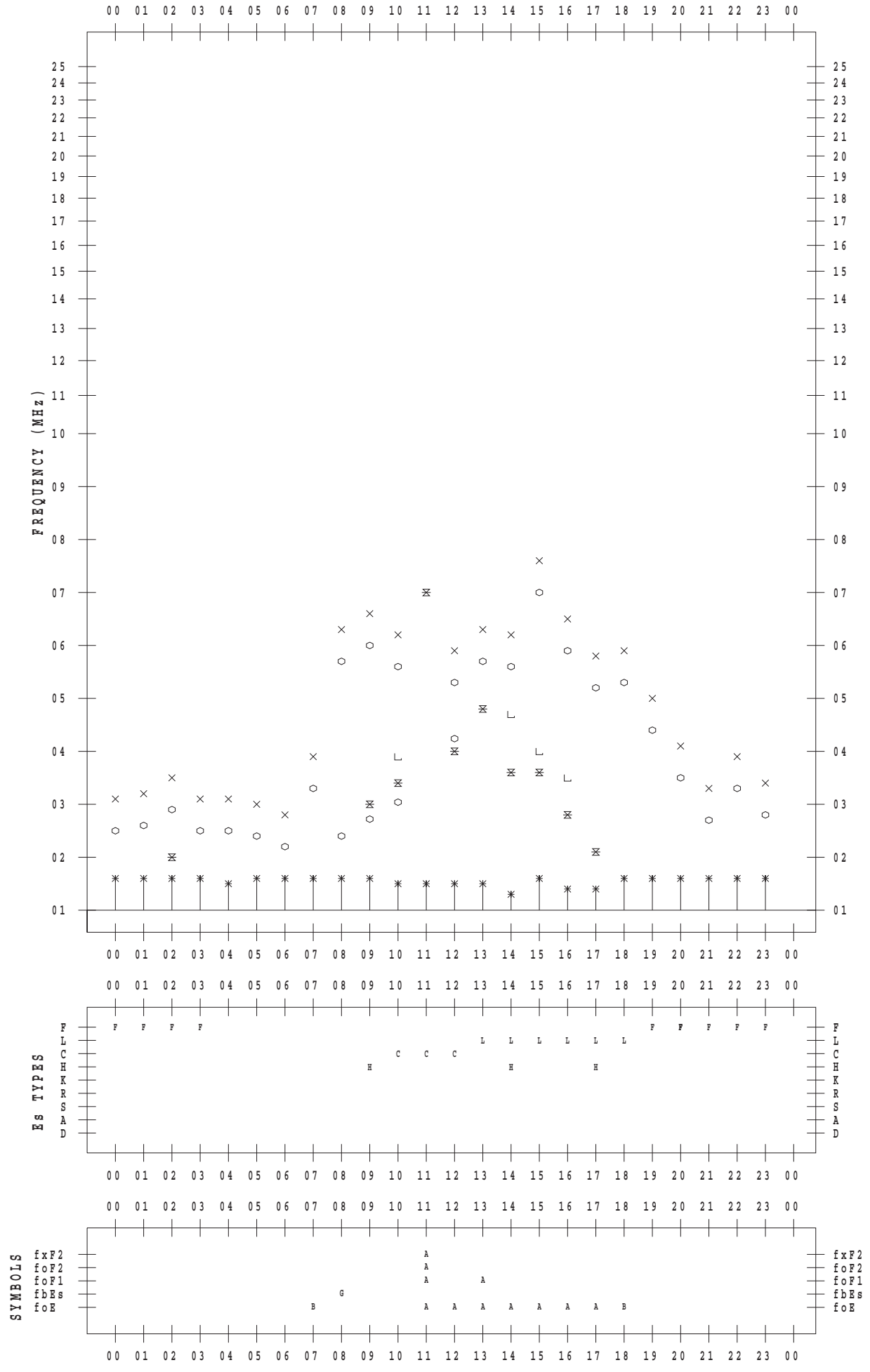
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/11

135 ° E MEAN TIME



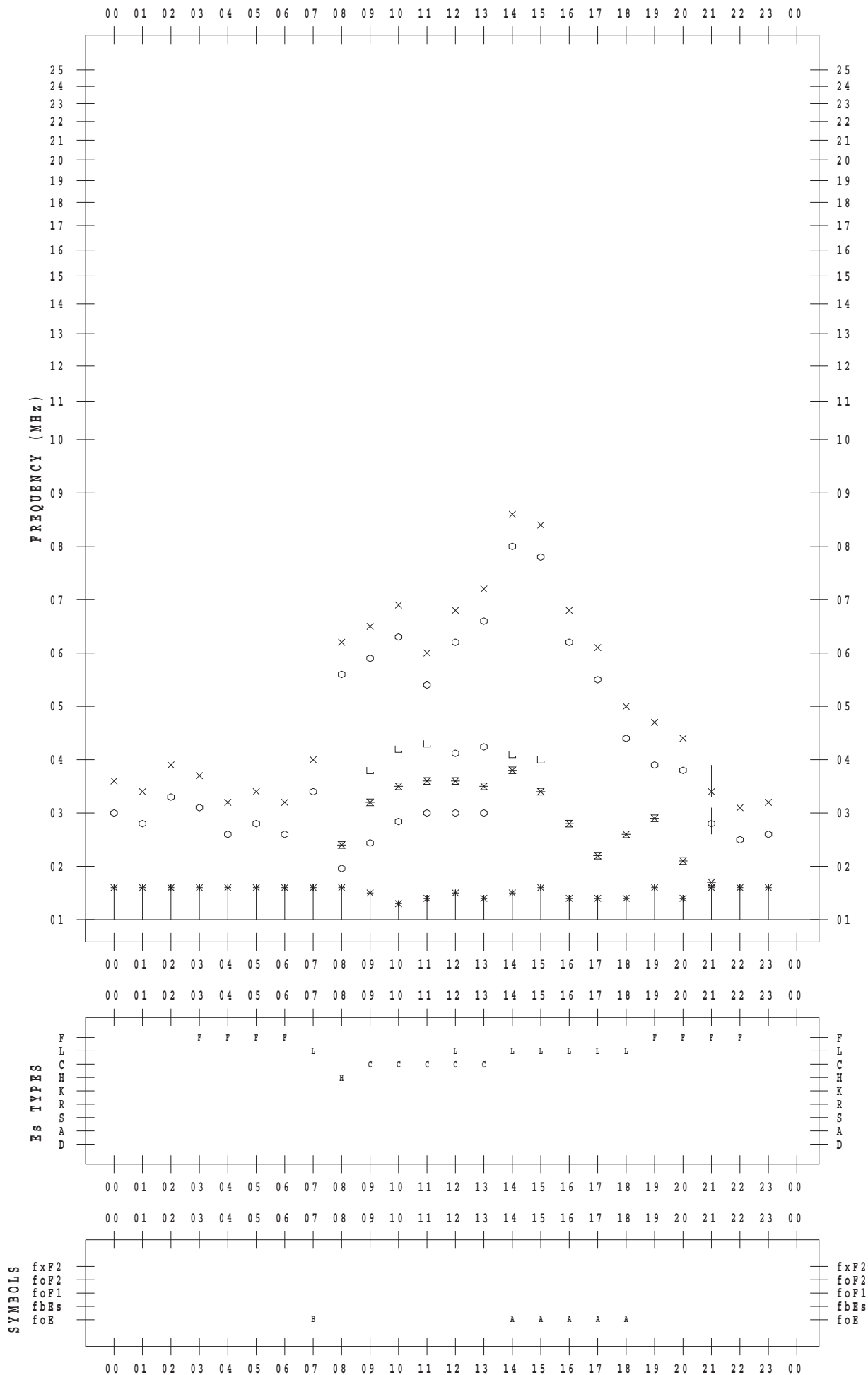
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/12

135 ° E MEAN TIME



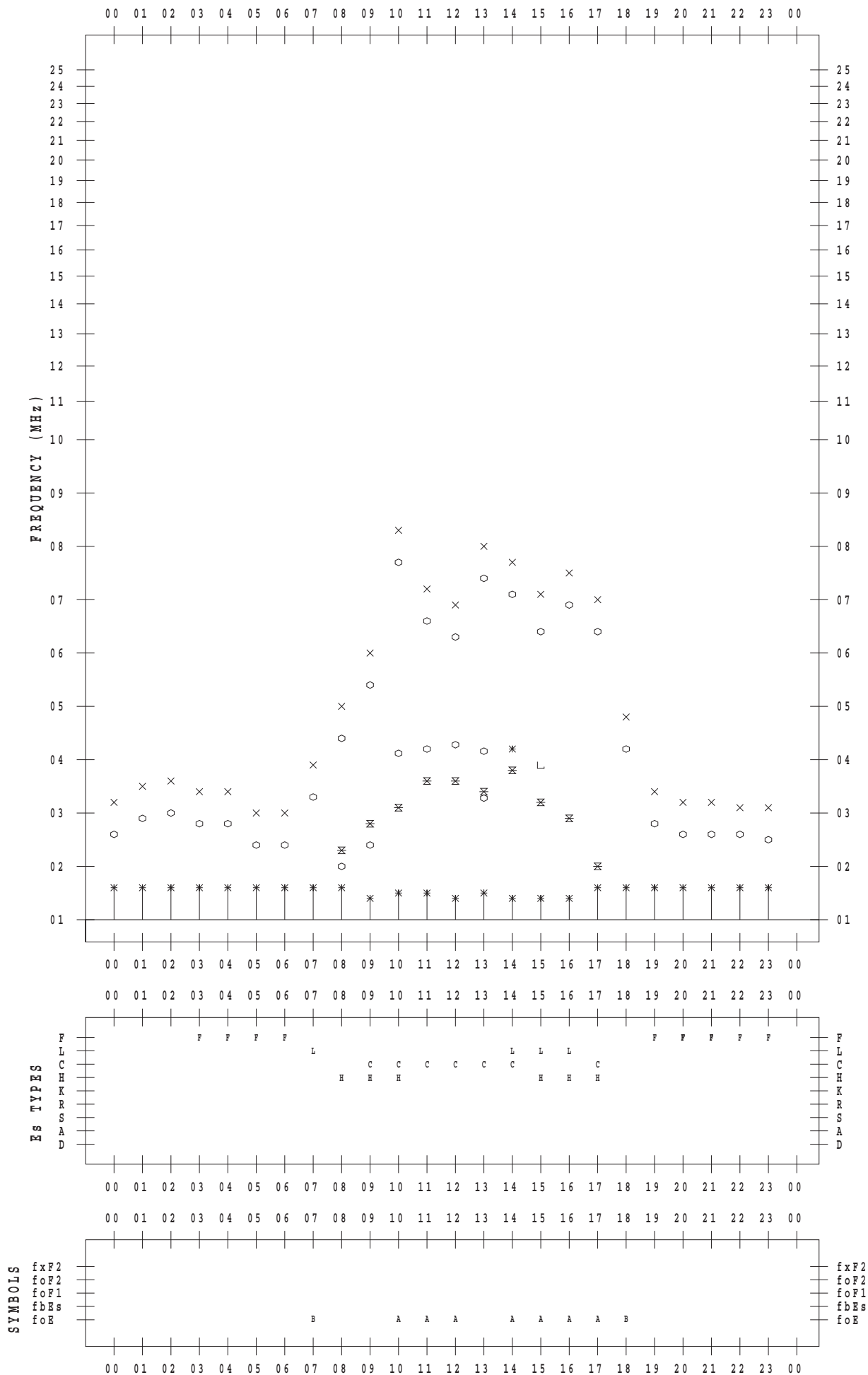
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/13

135 ° E MEAN TIME



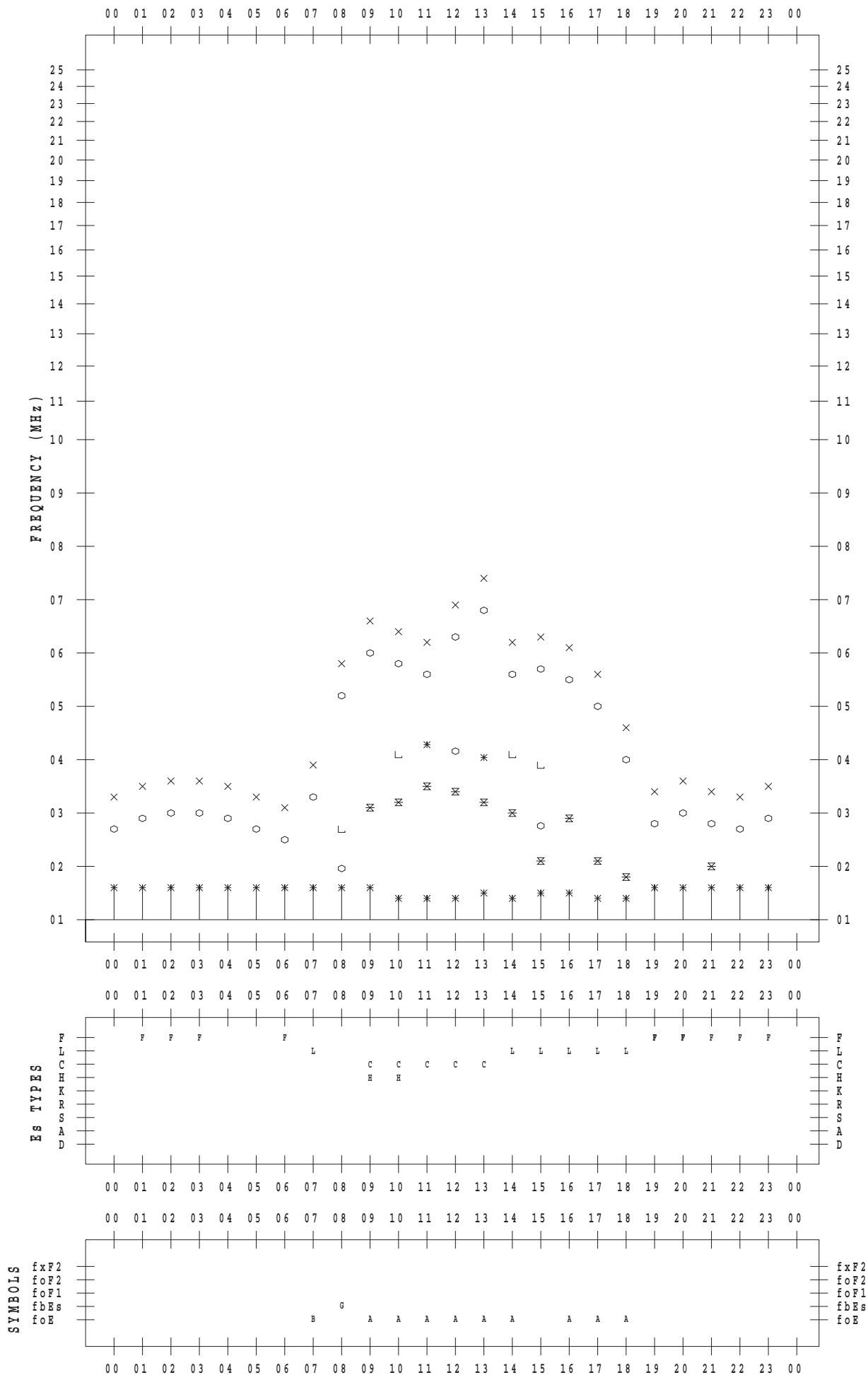
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/14

135 ° E MEAN TIME



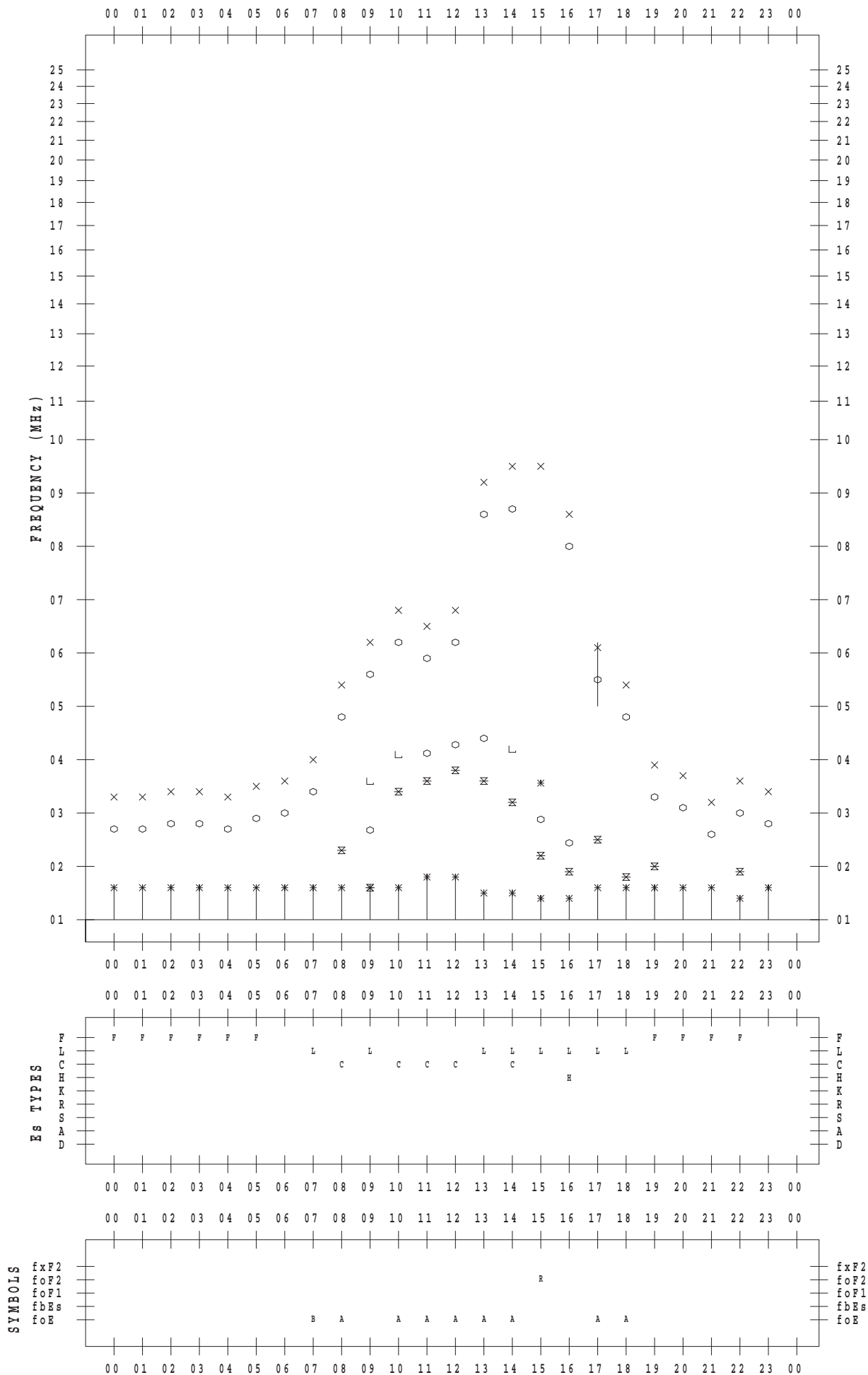
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/15

135 ° E MEAN TIME



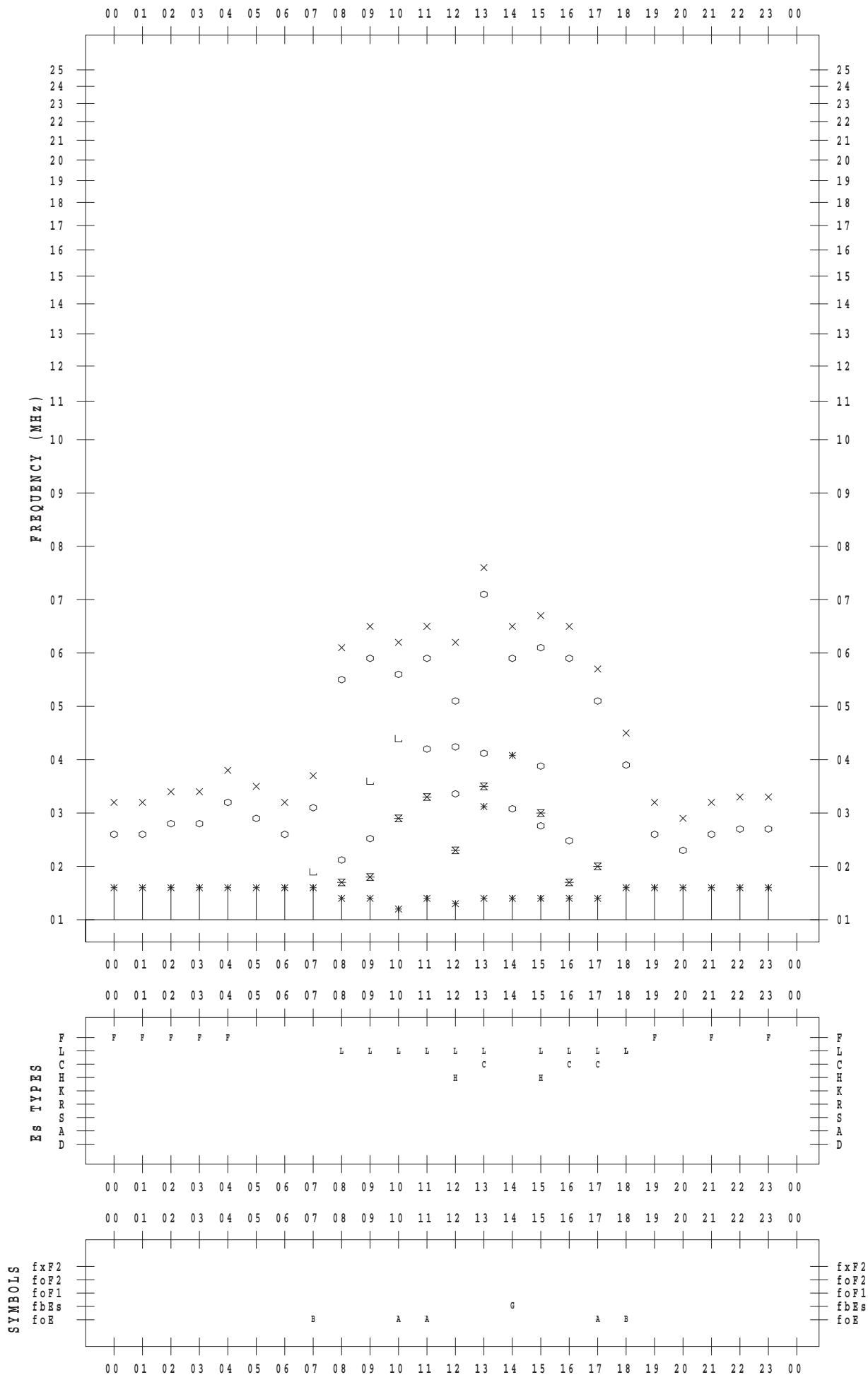
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/16

135 ° E MEAN TIME



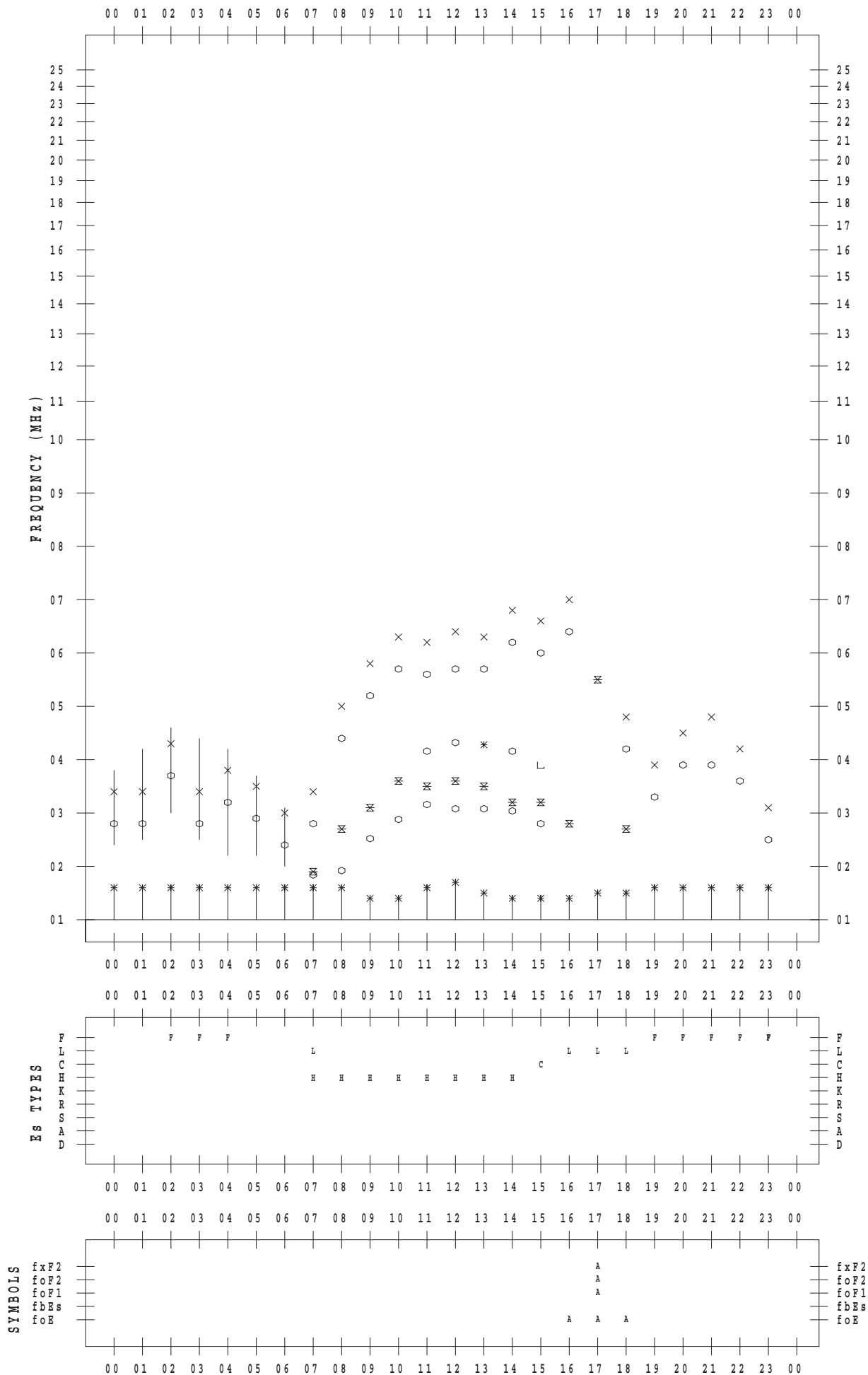
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/17

135 ° E MEAN TIME



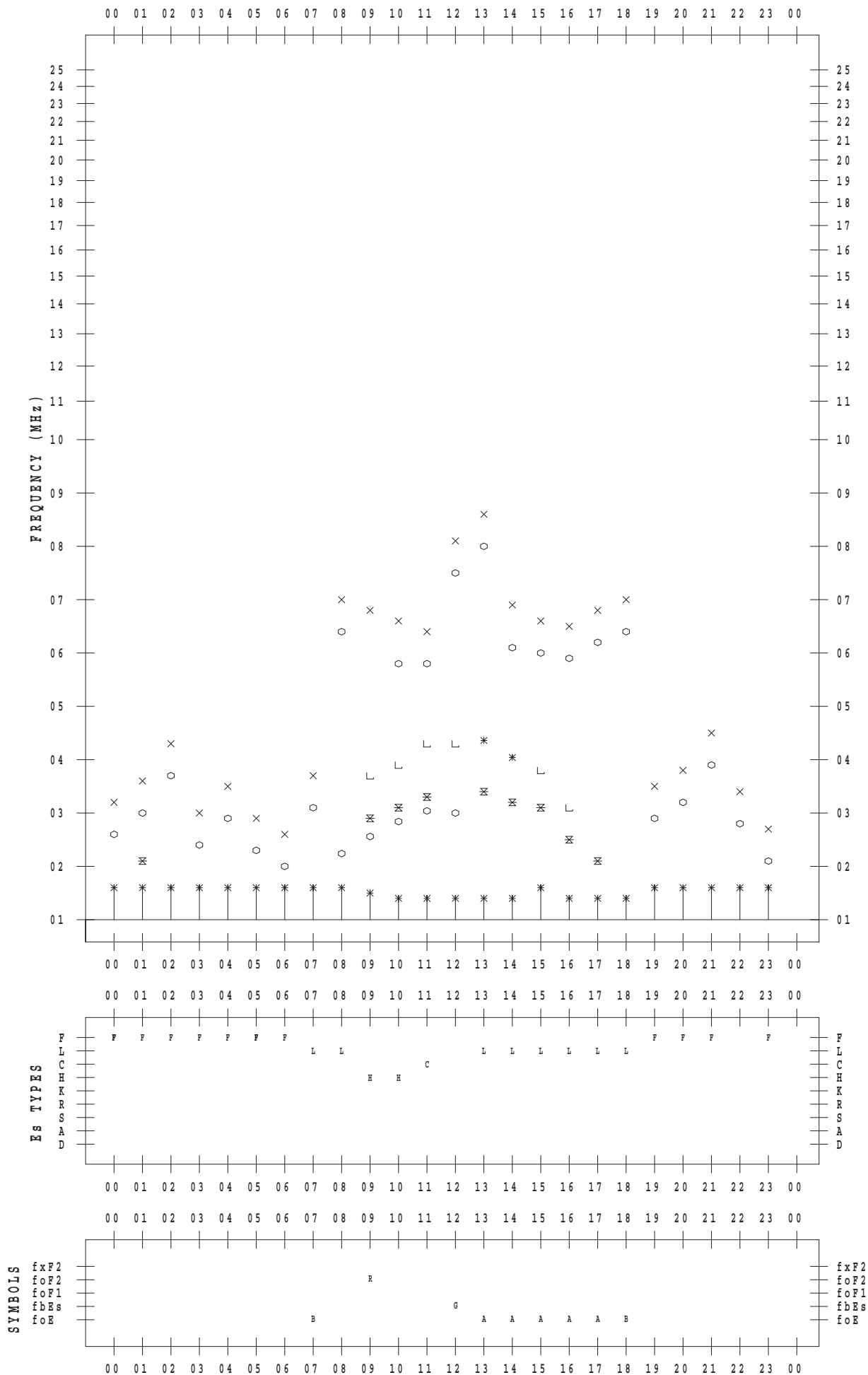
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/18

135 ° E MEAN TIME



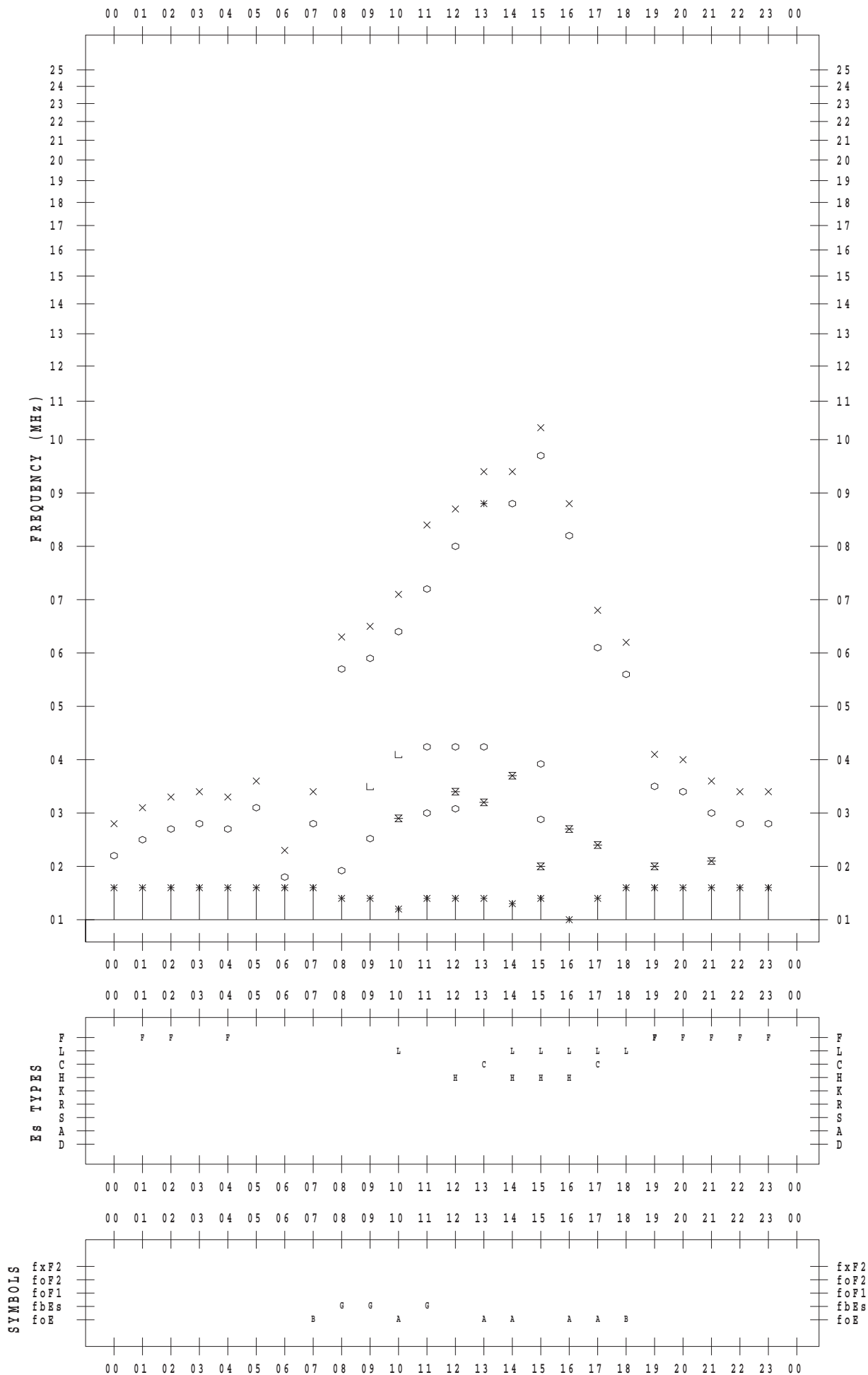
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SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/19

135 ° E MEAN TIME



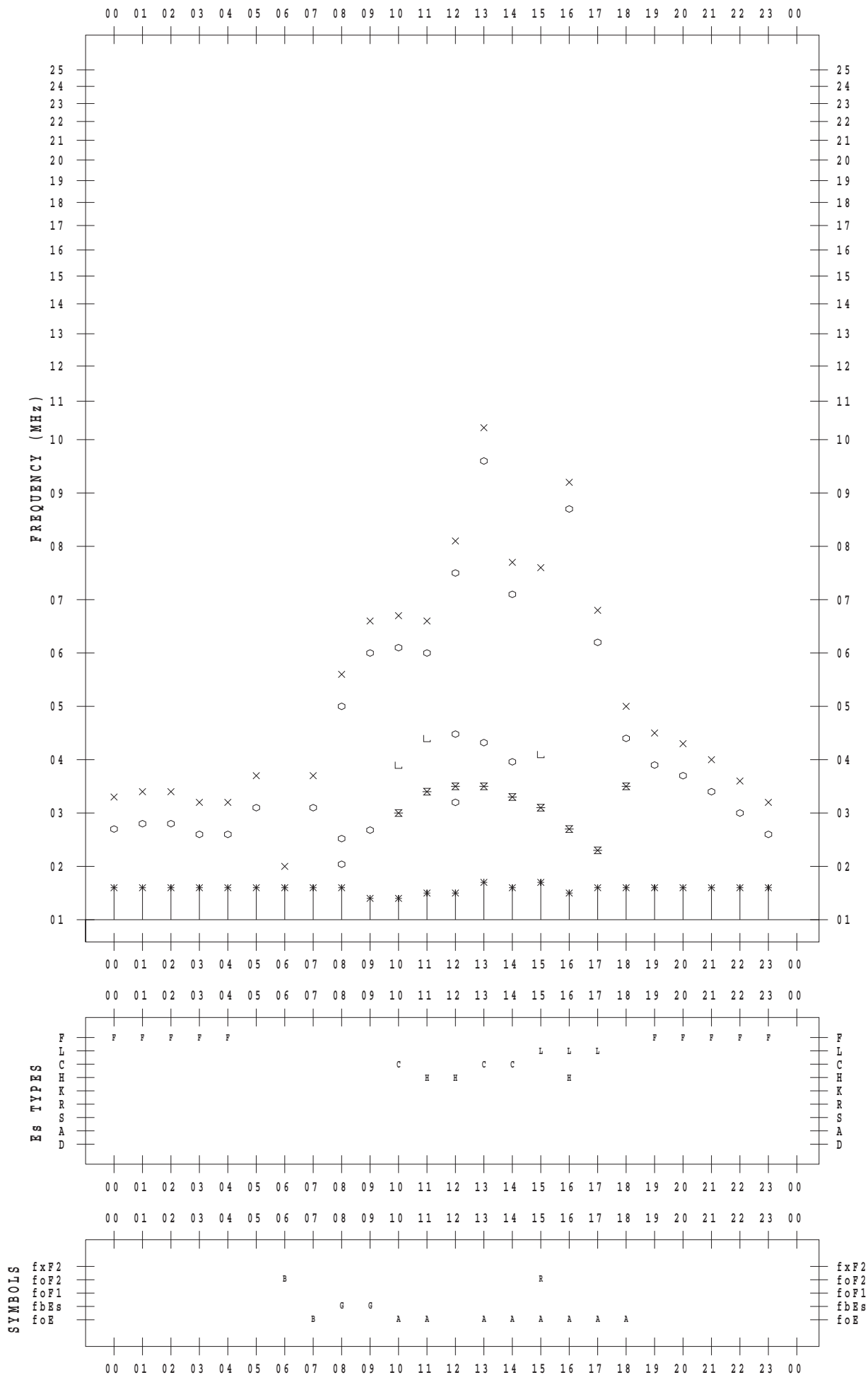
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/20

135 ° E MEAN TIME



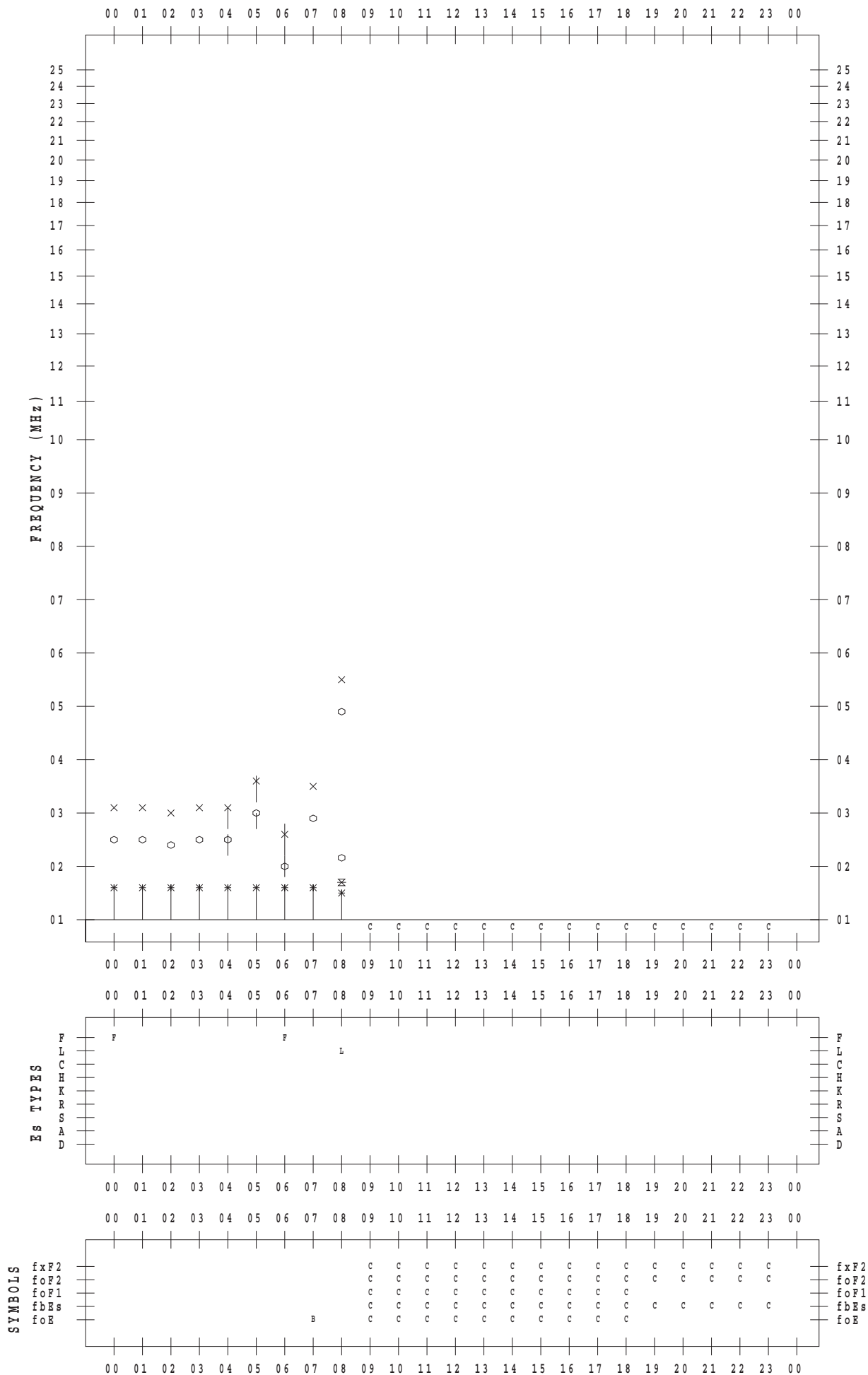
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/21

135 ° E MEAN TIME



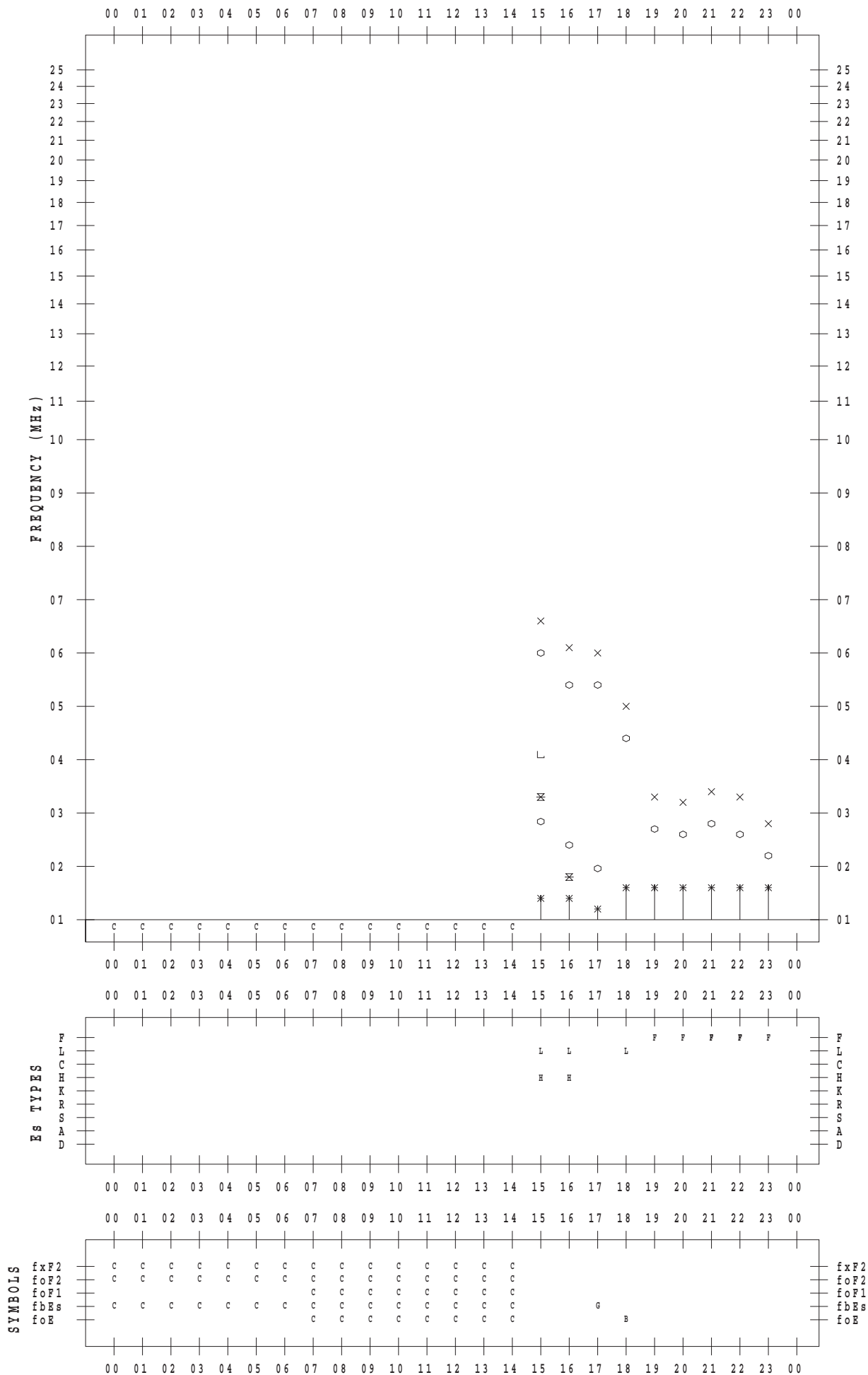
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/22

135 ° E MEAN TIME



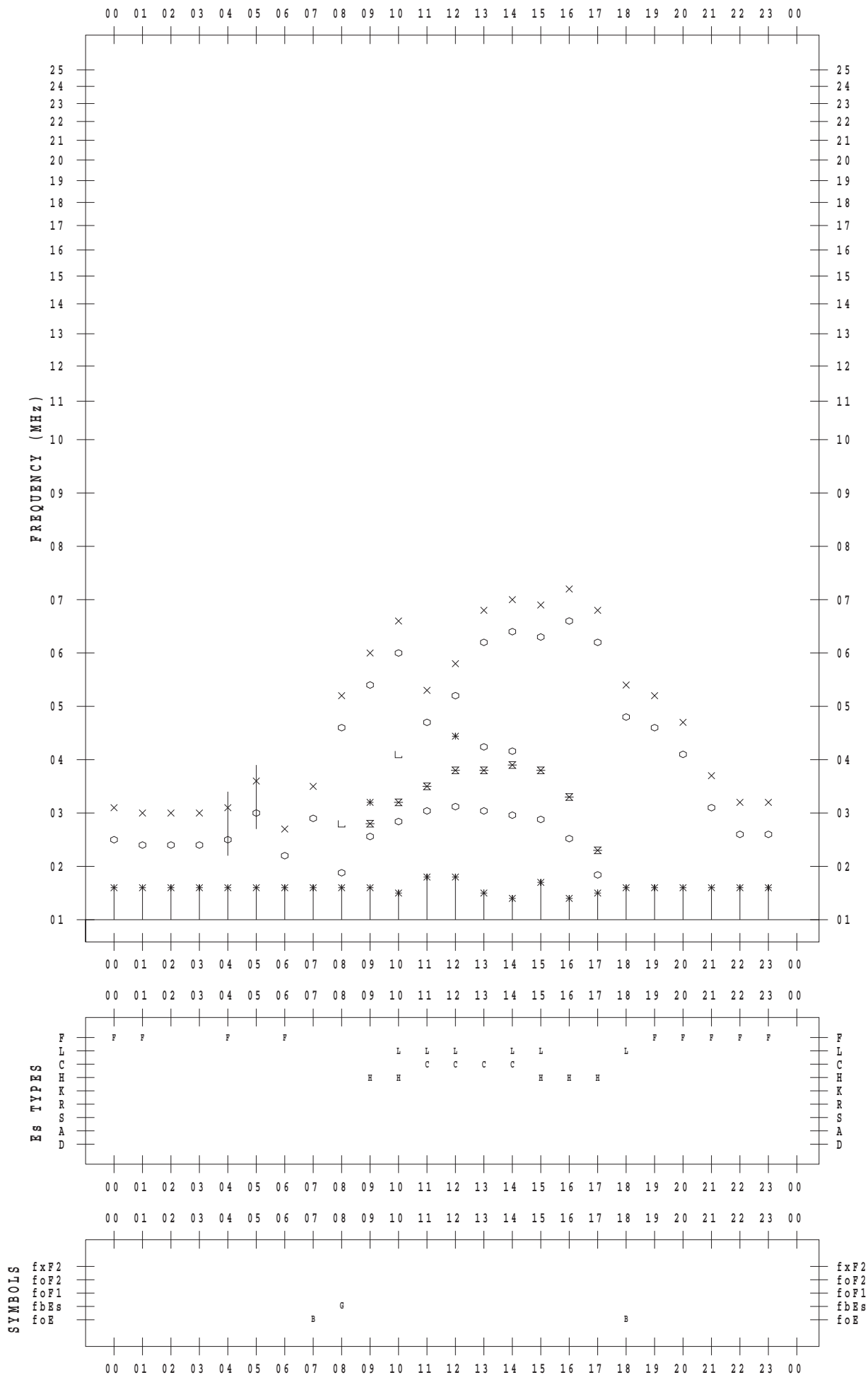
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/23

135 ° E MEAN TIME



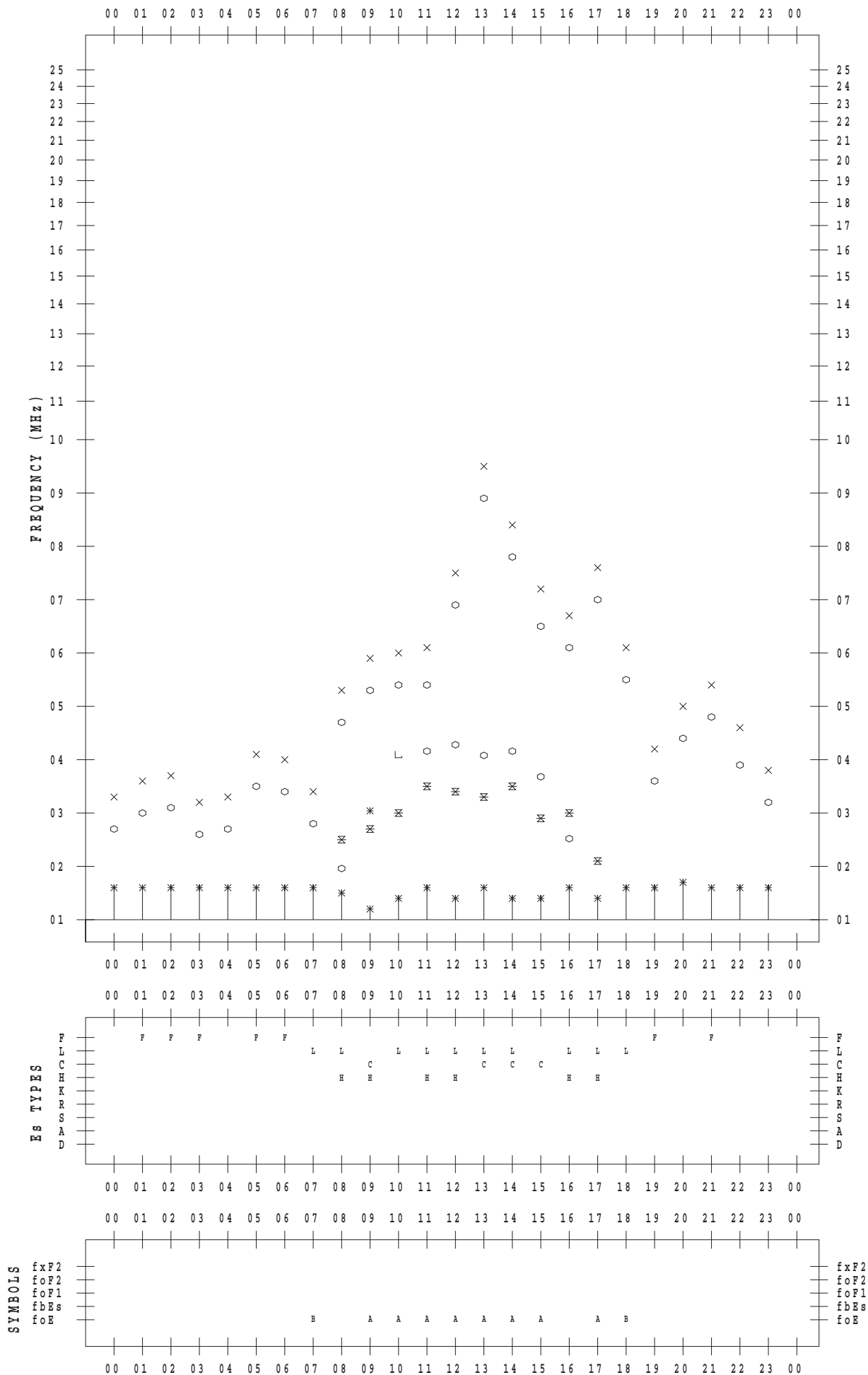
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/24

135 ° E MEAN TIME



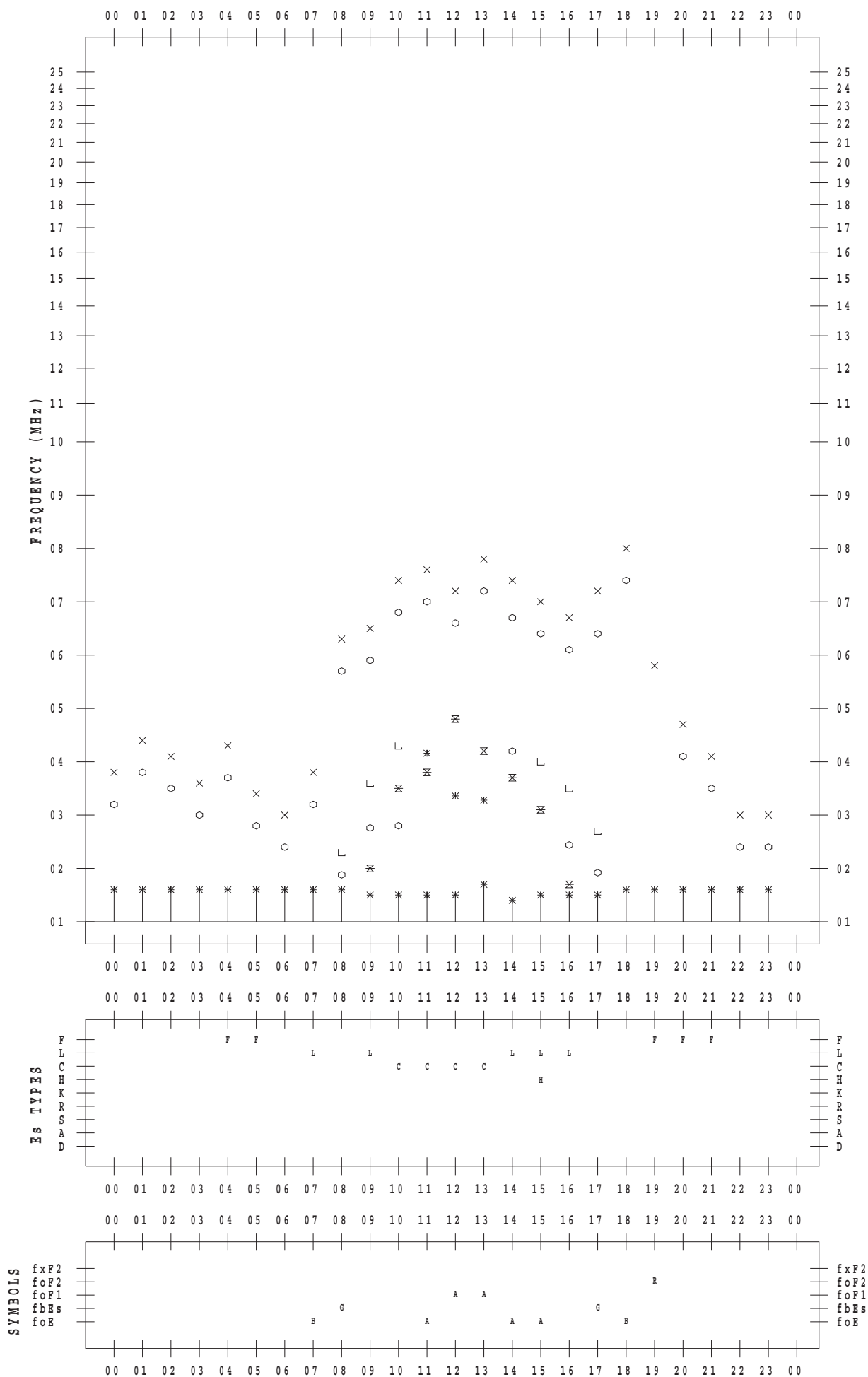
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/25

135 ° E MEAN TIME



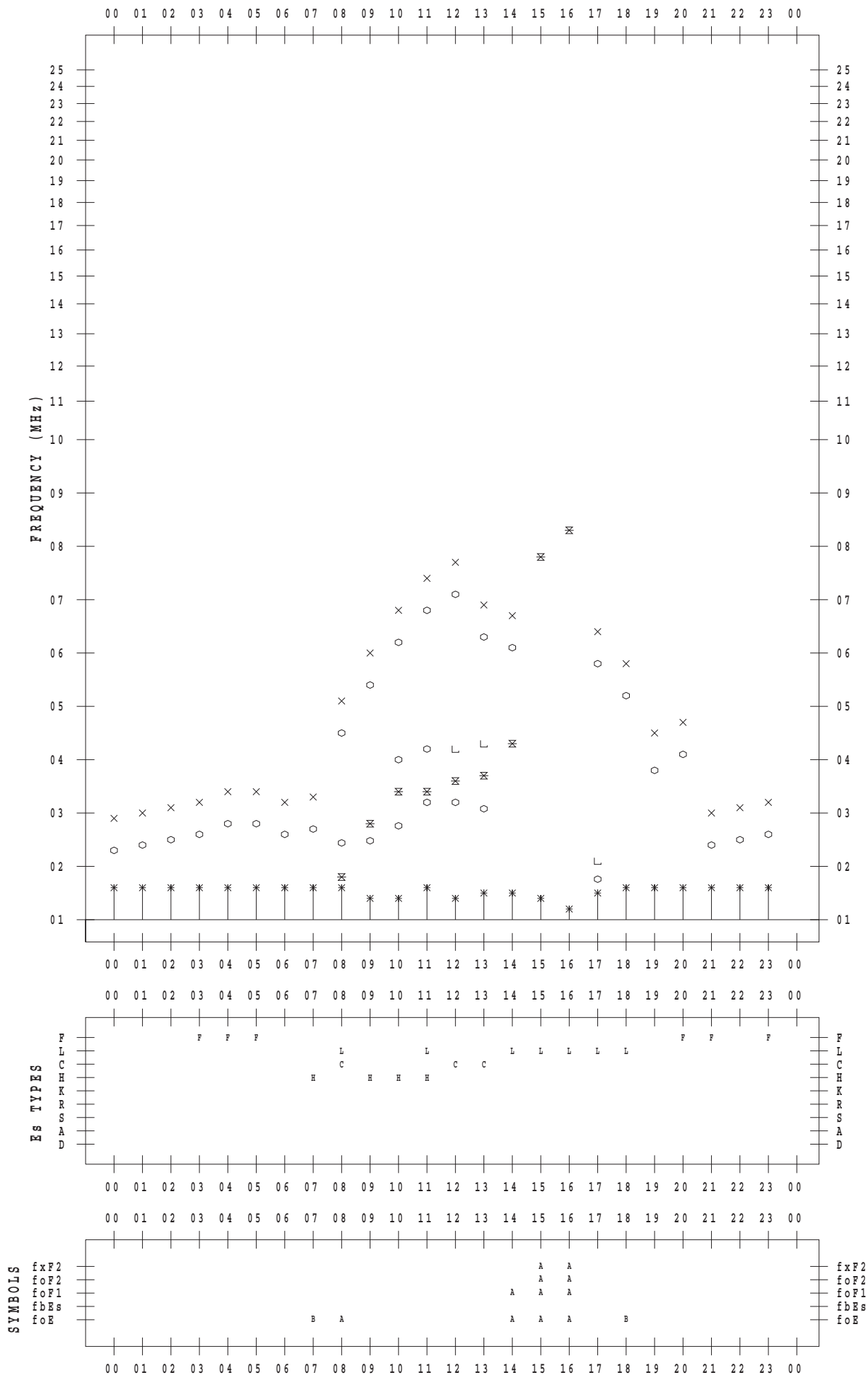
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/26

135 ° E MEAN TIME



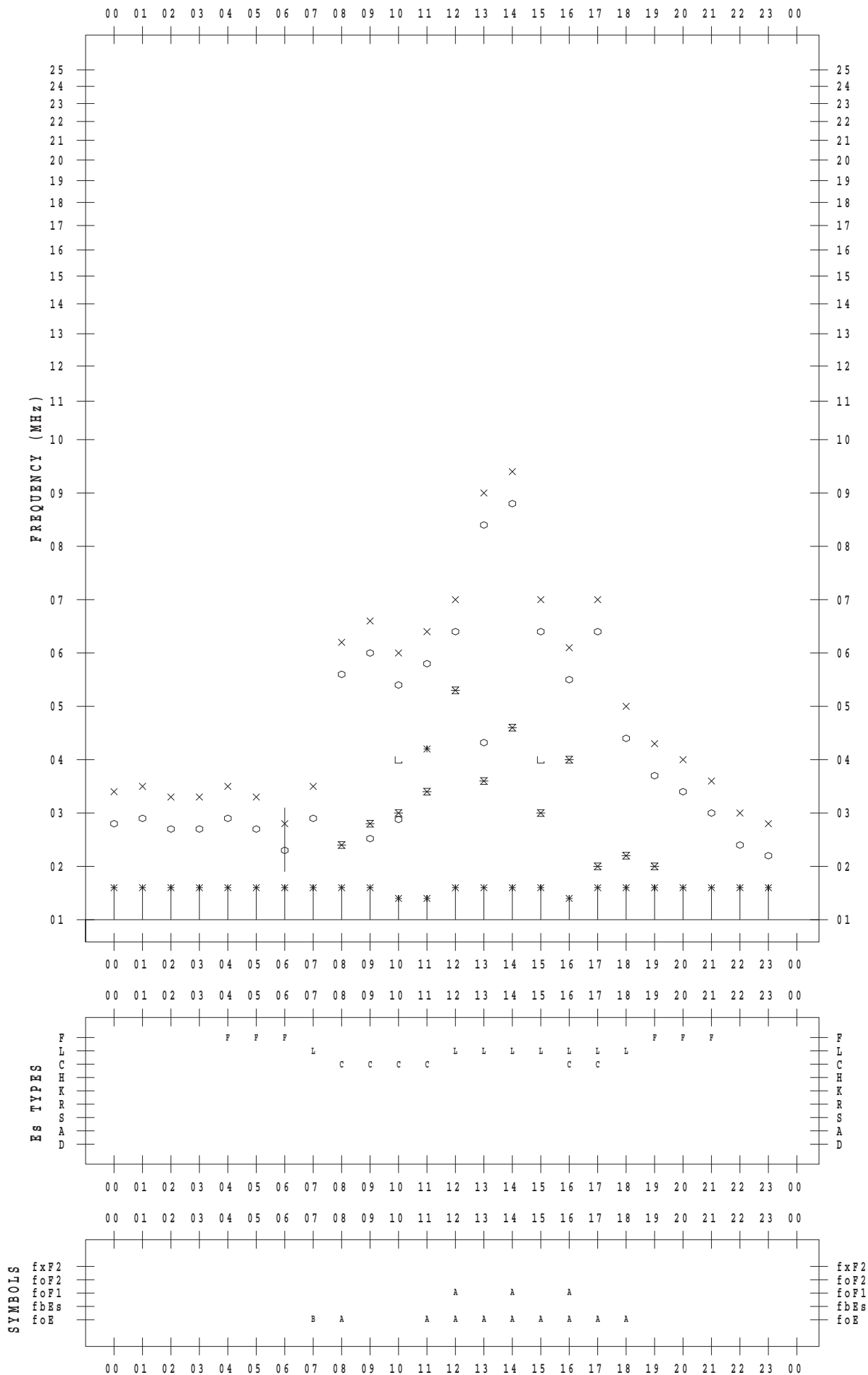
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/27

135 ° E MEAN TIME



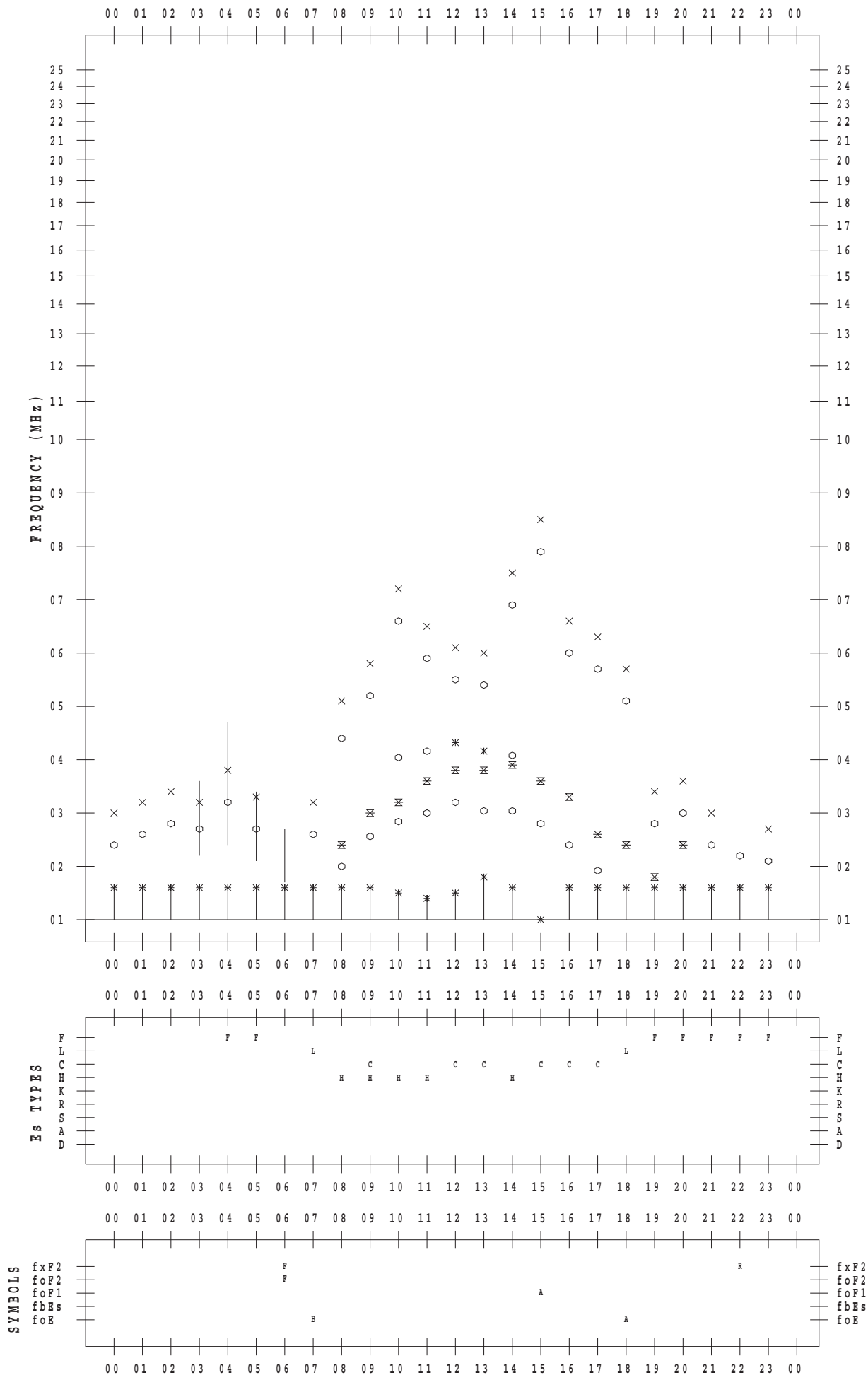
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/28

135 ° E MEAN TIME



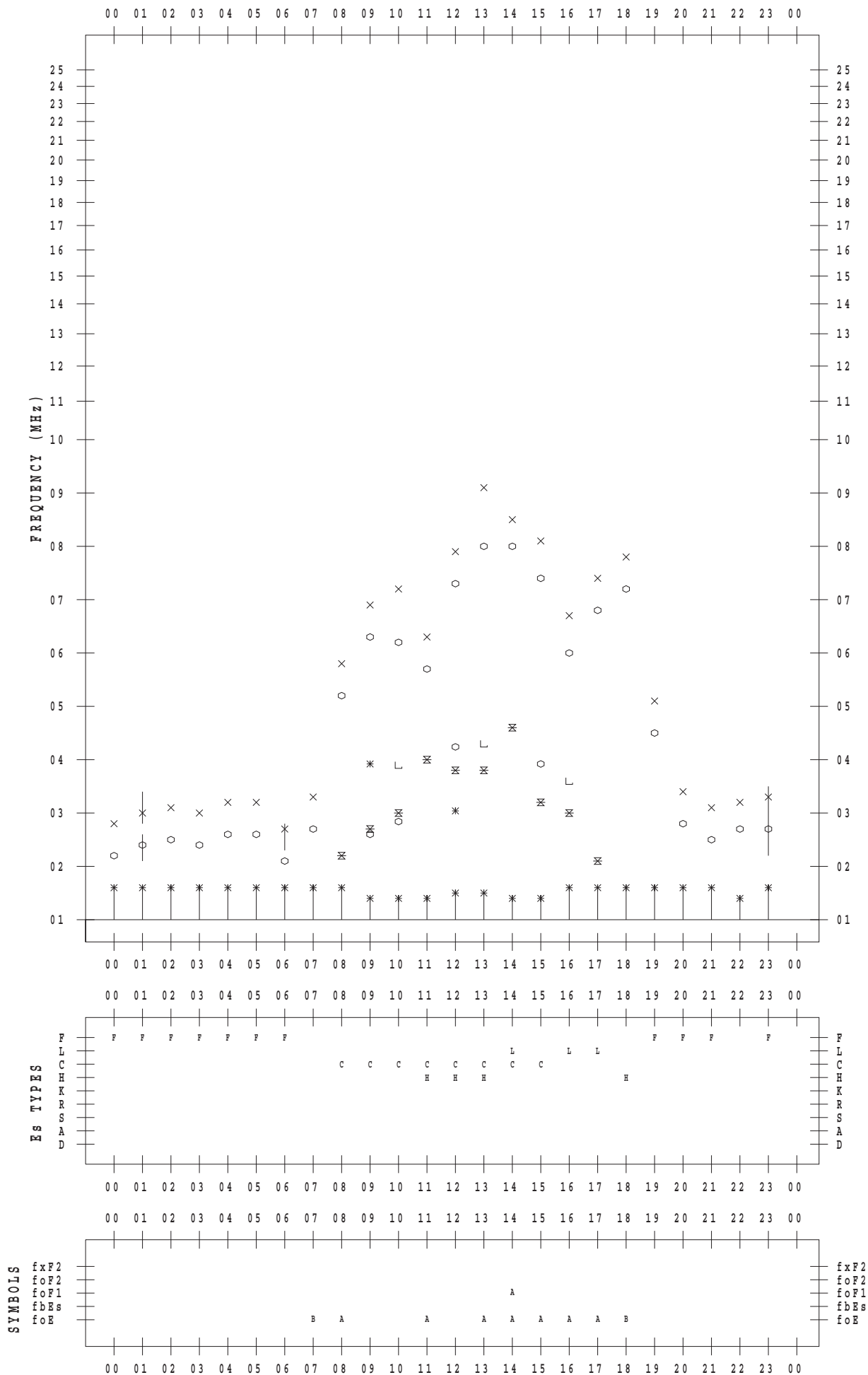
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/29

135 ° E MEAN TIME



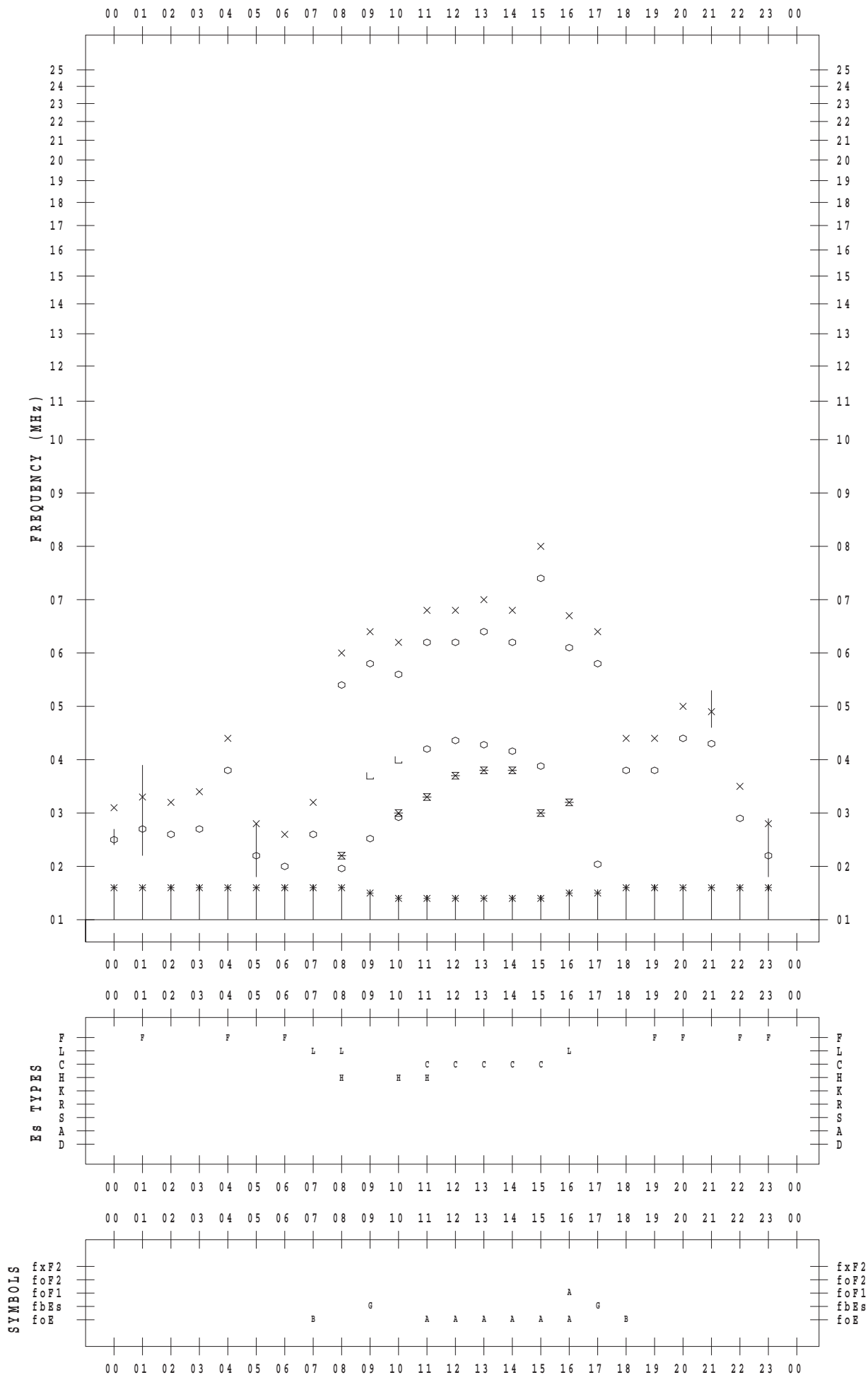
f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/30

135 ° E MEAN TIME



f - PLOT DATA

SCALER : I.YAMAZAKI

STATION : Okinawa

DATE : 2017/12/31

135 ° E MEAN TIME

